ELECTRICAL REVIEW

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27th August, 1948

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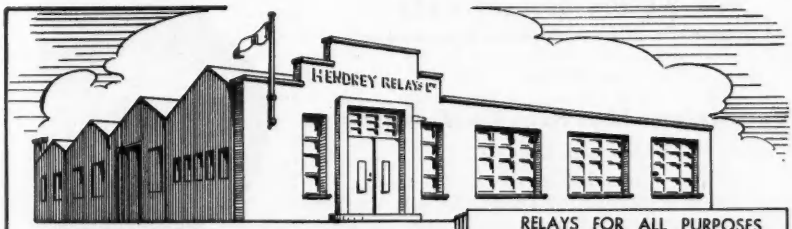

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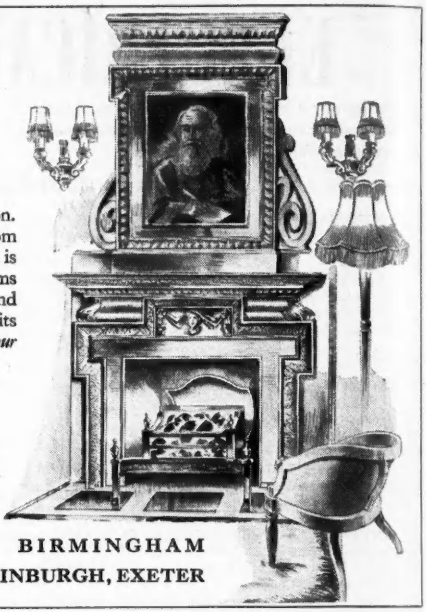

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXLIII. No. 3692 27th AUGUST, 1948 9d. WEEKLY

Britain and Marshall Aid

EXPECTING TOO MUCH?

WE have no means of knowing whether views expressed by the New York *Electrical World* on Marshall Aid and the British electrical manufacturing industry are widely held in the United States but we sincerely hope that they are not. These are based on an allegation by the paper that the British Government has "refused flatly to give a United Nations group any data on its ability to manufacture heavy power equipment or on its plans for exporting the same." Our contemporary goes on to remark that "Britain in its scramble for dollars wants to peddle its power equipment when and where—and for what currency it chooses."

As regards our manufacturing capacity there is no secrecy. By studying public announcements of the power plant put into service here and the monthly returns of exports published by the Board of Trade a fair idea of our output can be gained.

European Plant Production

The *Electrical World* says that the Paris Report (i.e., the 1947 Report of the Committee on European Economic Co-operation) stated that the participating nations themselves (including Western Germany) would produce 22·5 million of the 25 million kW of generating plant required in the period 1948-51. (The actual figure of requirements was about 22 millions all but 6 per cent of which, it was said, could be produced in Europe). Doubt is expressed whether this promise could be fulfilled and our contemporary says that it certainly will not be if Britain's exportable production of power equipment goes to nations other than those participating in the Marshall Plan.

This is where it is necessary to reflect upon the object of the Marshall Plan. Briefly it is to stimulate self-help and mutual aid in Europe, to place the war-stricken countries on their feet. This country has a grave power shortage which militates against industrial recovery. The shortage is due to the war and to what the *Electrical Review* regards as a mistaken post-war policy of cutting down plant expansion at home in an endeavour to make available supplies of materials go round our staple industries. This has been accentuated by the necessity to export all we can and power plant is particularly remunerative in this respect.

Other Obligations

Some of our exported power plant is already going to Europe but we have obligations to other countries as well, especially the Dominions—and we have to endeavour to pay our way. If we were to ignore other obligations and send all our exportable surplus to Europe we simply could not continue to live unless we received "Marshall" dollars from some of these countries for it. Their own inconvertible currencies would not help us towards recovery.

If we went back on our contracts to supply plant to the Dominions and other non-European customers to whom would they look? United States manufacturers are the only possible suppliers, and if they are in a position to take our place in these extra-European markets surely it would

be possible for them, instead, to provide plant for Europe if Continental countries are unable to produce their own.

We feel sure that it is not the intention of the United States Government to hamstring us while American manufacturers take over our traditional markets. That is why we do not believe, as the *Electrical World* seems to, that the administrators of the power plant aspect of the European Recovery Plan will force this country into the suicidal policy which the *Electrical World* thinks we ought to pursue. We are willing and anxious to do all we can but have got to be fed and the Continental countries are hard put to it to feed themselves.

PRICES AND THE PRESS

FROM the statements made by the chairmen of Area Electricity Boards in May it was obvious that there was a general intention to make ¾d. per kWh the minimum charge under domestic two-part tariffs and in a number of areas lower charges were raised to this level. It would have been wiser for the British Electricity Authority and the Boards to have stated this quite boldly at that time and thus prevent the duplication of the outcry from a hostile lay press. No doubt there is something to be said for a gradual approach to the problem of making the supply system solvent, but the public is not allowed by the newspapers to forget the previous stages and ill-will is engendered. In the latest statement nothing has been said to show that electricity is still one of the very few commodities which have not advanced in price at the same rate as everything else.

NEW ZEALAND CURRENCY

THE decision of the New Zealand Government to raise the value of the N.Z. pound to the level of the pound sterling (from 16s.) has naturally given rise to discussion of the possible results upon trade between the Dominion and this country. So far as the principal exports from New Zealand are concerned it will make no difference as they were already on a sterling basis. Imports into New Zealand from Great Britain will be cheaper—but so will those from other sources. It may be that one effect will be to encourage the Dominion Government to relax import controls to some extent for New Zealanders are still short of many classes of goods which we may be able to supply. The value of our exports to New Zealand is now only about half that of our imports from the Dominion so that there is plenty of scope for expansion—if we cannot dispose of our goods in "hard currency" markets.

SELLING IN AMERICA

IN our leading article of 13th August we suggested that British prices in the United States could never be lower than those of American producers. A correspondent considers that this is a "defeatist" attitude and contends that in some directions American industrialists are becoming very nervous about our competitive ability. In his own particular line—insulated wires, he says, American practice is much behind ours. British makers of his kind of plant are able to beat United States manufacturers and our correspondent is confident that we are producing fine enamel wires with less man-hours than the Americans. He also says that this condition extends to other products. Reference is made in his letter to the extravagantly high United States protective tariffs; it is these which are largely responsible (as they are intended to be) for overseas suppliers' difficulties in the American market. We are glad, however, to be able to qualify our perhaps too-inclusive statement.

PRODUCTION CENSUS

THE Partial Census of Production, preliminary results of which are now being published, is the first post-war work of the Census Office and will, it is stated, be followed by a more complete census for the present year. A relatively small number of industries playing a vital part in combating existing economic difficulties, and providing a representative cross-section, have been selected, and the reports so far published include the cable, battery and lighting fittings sections of the electrical industry. The preliminary reports do not cover all the data collected but there is evidence of marked expansion compared with 1937. An indication of this is the increase in the amount of electricity purchased, which in the cable-making industry rose from 101·4 million to 159·6 million kWh; in battery manufacture from 24·7 million to 44·4 million; and in the lighting fittings section from 5·6 million to 10·6 million.

Large-Scale Bread Making

Up-to-Date Material-Handling Installation

As we are constantly stressing the supreme importance of the modern conception of material handling, i.e., in which the handling installation is regarded essentially as part, and often the primary part, of the production plant and not a mere auxiliary, we welcome the opportunity to publish this description of an installation specially designed to maintain extremely high output in what is believed to be the largest single-unit bakery in the country. We refer to the installation at the Wonder Bakery at Wood Green, North London, of the Wonder Baking Co., Ltd.

At this bakery, a particularly well lighted, clean and spacious three-storey building, flour is received by road at an average rate of about 100 tons per day at the ground floor where the bags are placed on a Spencer bag elevator which raises them to the second floor. This elevator, which will handle about 240 bags per hour, is driven by a 3-h.p., 1,440-r.p.m. motor, mounted on a girder structure in line with the head drum of the elevator. Transmission is first through a 5 to 1 ratio V-belt scheme to a countershaft, and then by chain with a similar speed ratio to the driving head.

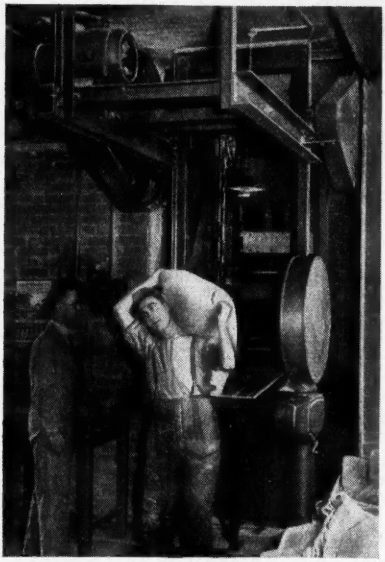
After delivery on to an Avery weighing machine on the second floor, the flour is shot into hoppers which serve a blending machine suspended from the ceiling immediately below. It passes through the sieve of this machine, to which an agitation motion is imparted by motor-driven cam gear, along a short screw conveyor, also suspended from the ceiling, to the boot of a bucket elevator which brings it to ceiling level on the second floor again where another worm conveyor receives it and passes it to a flour-weighing hopper. When the correct pre-set weight, up to 560 lb, has been received in the flour-weighing hopper a mercury switch is automatically operated with the result that the worm and elevator and sieve drives are all switched off. The flour is then allowed to fall through a gate valve in the bottom of the hopper into a portable wheeled mixing bowl beneath the hopper.

The flour-filled mixing bowl is then placed on the turntable of a dough-mixer, near a water-blending machine from which it receives a mixture of water, yeast and salt. In the blending machine hot and cold water are fed into a mixing column, where the correct rates of flow are adjusted to afford the required temperature. The water is then passed on to a central tank, and when the correct quantity of water has accumulated in this tank a solenoid is operated, thus shutting off the water supply from the mixing column. Necessary ingredients are added to the water in the central tank, in the bottom of which is a motor-driven agitator. The motor has

simple direct-on switching with on and off push-button control.

When all is ready hand-operated valves allow the water mixture to flow into a flour-filled mixing bowl on the nearby dough-mixing machine. A 7½-h.p., 960-r.p.m. motor serves the two motions on the dough-mixing machine, namely, the mixing arm and mechanical kneading "hands" inside the bowl, and the rotating table. First transmission is through V belting with a 3 to 1 speed reduction to a countershaft. Transmission from this shaft is through a train of gears which transmits to the reciprocating mixing arm, while transmission to the turntable is by chain and worm gearing.

After a "waiting" period the bowl of mixed dough is then run on to the lifting carriage of an "Elevo," a machine which tilts the bowl so that the contents run out into a hopper at floor level. This machine is driven by a 3-h.p., 1,250-r.p.m. motor. Transmission is first through a 3 to 1 ratio speed-reducing V-belt scheme on to a bevel gearing which revolves a screw which travels a nut swivelled in the lever-arm lifting (tilting) mechanism of the bowl. Between the V-belt pulley and the bevel gear is a magnetic brake. The motor is controlled by push buttons, but the brake is operated automatically by means of limit switches on the lifting mechanism.



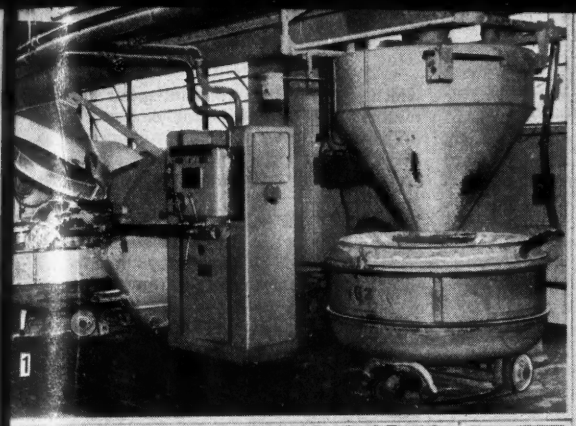
A bag elevator raises 100 tons of flour per day to the second floor

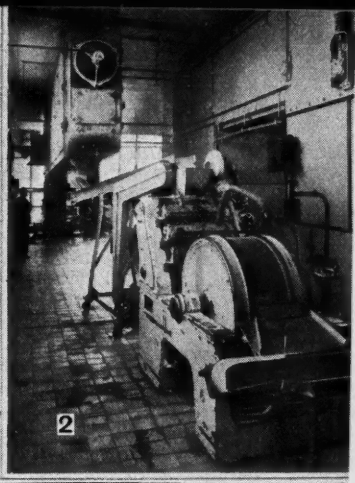
The dough passes down to the floor below through chutes and is fed through an adjustable gate valve into a divider which cuts up the dough into pieces of the correct size. In this machine a ram pushes the dough into a pocket in a reciprocating head, the movement of which separates the piece in the pocket from the bulk. The divided pieces fall on to a belt conveyor which passes them on to an adjacent handing-up machine, the essential feature of which is a horizontally revolving cone around which the pieces pass in guides in spiral fashion. The pieces thus become suitably shaped, and as such they are passed into the fabric cups of the elevator-conveyor of the first prover, a long warming chamber in which "lightness" is imparted to the dough.

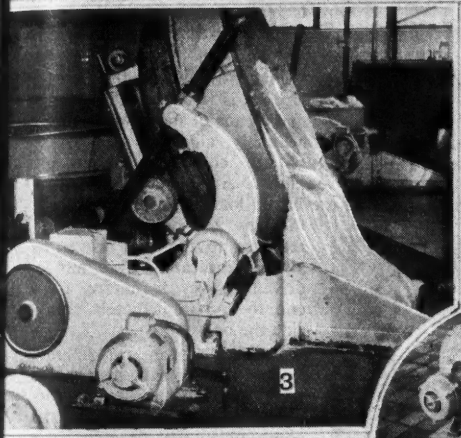
This group of machines—the divider, the hander-up and the elevator-conveyor of the first prover—is driven by a 4-h.p., 1,500/500-r.p.m. variable-speed a.c. commutator motor. All three components are operated from a chain-driven main shaft, the divider movement through cams and gears, the revolving cone of the hander-up by a worm gear, and the elevator-conveyor of the first prover also by worm gear. For impelling drying air to several points of the hander-up cone and the conveyors, to prevent the dough sticking, there is a simple directly motor-driven turbine fan. In the bottom of the enclosed chamber of the first prover are a number of tubular heaters for drying out the returning empty fabric pockets of the conveyor-elevator before they are refilled.

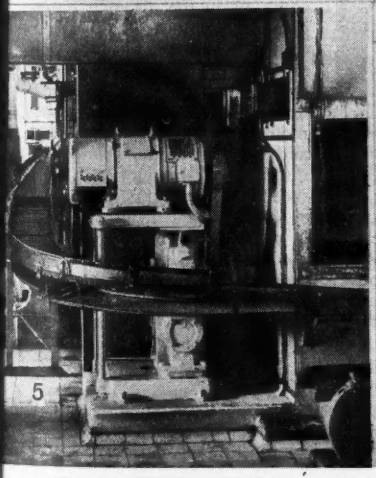
At the other end of the first prover the risen pieces of dough fall out into a moulding machine which first passes them through a series of graduated rollers and then round the bottom portion of a finishing drum and on to a conveyor for transit to the second prover. The moulding machine is driven by a 2-h.p. motor and there is chain transmission to the graduated-roller and the finishing-drum shafts. Associated with this machine there is also a small motor-driven fan for supplying drying and cooling air to appropriate parts of the machine.

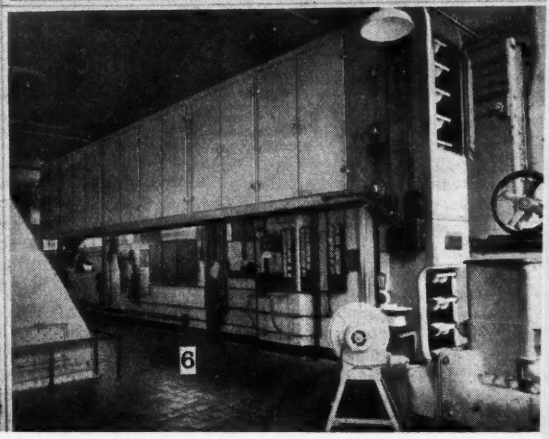
The pieces of dough are soon to be introduced to their baking tins which are first







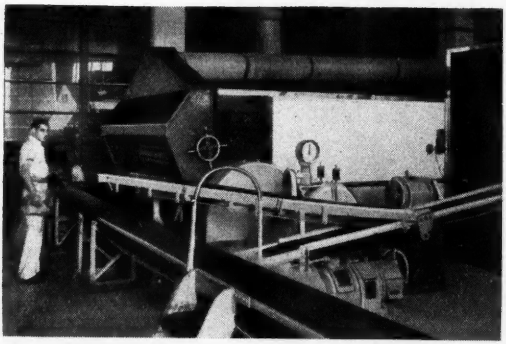




(1) The dough mixer (left) receives flour from the weighing hopper (right) and water mixture from the blending machine (centre). (2) At the delivery end of the first prover the pieces of dough fall into a moulding machine. (3) The dough-bowl tilting machine motor is equipped with a limit-switch-operated magnetic brake. (4) A 4-h.p. group drive serves the divider (rear), the hander-up (front) and the elevator-conveyor of the first prover (left). (5) The final prover is driven by a variable-speed a.c. commutator motor. (6) In the long warming chamber of the first prover "lightness" is imparted to the dough

greased. For this purpose there is a portable box-type trolley with a number of upward projecting motor-driven revolving greasing brushes which are mechanically reversed every few seconds. The empty tins, which are received immediately after service back from the front of the baking oven on a conveyor, are placed over the revolving greasing brushes in an inverted position, one tin per brush, so that the brush covers the whole of the interior surface of the tin.

At the entrance of the second or final prover the pieces of dough are placed in the greased baking tins which are placed on an endless tray conveyor carrying them through a lengthy and tortuous path in the warmed chamber in which they " rise " to the required extent ready for baking. The final-prover conveyor is driven by a 4-h.p. variable-speed a.c. 1,450/800-r.p.m. commutator motor. The motor speed is varied according to the prover temperature conditions and the size of the loaves under treatment, and while the conveyor cycle is governed by the set speed of the commutator motor, this is but one factor of the interdependent conditions which contribute to the complete operation.



The speed of the baking oven conveyor motor (near belt conveyor) is referred to in terms of baking time; constant-speed emergency motor on right

The dough-filled tins are taken from the delivery end of the final prover and placed in a travelling-plate baking oven. The oven plate is driven by a 5/2·7-h.p., 1,100/500-r.p.m. variable-speed a.c. commutator motor. Transmission is first through a pinion-gear unit to a worm gear and from this through another pinion gear unit to the driving-head shaft of the oven conveyor. An extension of the worm shaft, normally disconnected, aligns a shaft from another pinion gear which is driven by a constant-speed slip-ring motor. This motor is for emergency use only when the worm shaft is connected on the constant-speed motor side and disconnected on the variable-speed motor side.

Normally the speed of the conveyor is governed by that of the variable-speed motor which is referred to directly by the baker in terms of baking time, i.e., from 20 min to 100 min for a complete run from end to end of the 60-ft long baking oven. There is an extraction fan at each end of the oven to expel steam from the bakery. The oven is gas fired, but heat transmission directly to the oven chamber is by steam tubes. The temperature is controlled by Bristol instruments through Satchwell automatic motorized valves.

In the most recently installed oven the heat inside the oven is re-circulated over the heating tubes by means of motor-driven fans situated immediately alongside the oven. These motors are cooled by separately motor-driven fans. At the delivery end of the oven the baked loaves are removed from the tins, the empty tins being returned to the final prover, as already indicated, by a motor-driven conveyor running from end to end immediately alongside the oven.

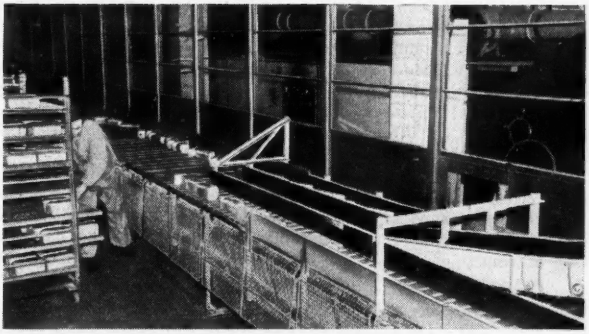
From the ovens on different floors the baked loaves are passed by a system of conveyors and chutes on to a wide slat conveyor in the dispatch room on the ground floor. This conveyor is about 80 ft long and several operatives work at it throughout its length. It is driven by a 2-h.p., 1,440-r.p.m. motor, first through chain gear and then by pinion gearing to the conveyor driving head. The speed is about 40 ft per min.

The loaves are removed from the slat conveyor and placed on portable cooling racks. After cooling they are placed on the conveyors of wrapping machines. Because of the national paper shortage loaves are not being wrapped at present. The conveyors load the loaves directly on to delivery vans which take the bread direct to the wholesale customers.

Except where otherwise mentioned the motors throughout the installation are squirrel-cage or slip-ring machines, according

to their size. Most of the motors are of B.T.H. manufacture. The starters are direct-on or star-delta for the s.c. motors, according to their size and duty, and stator switches and rotor regulator resistances for the s.r. motors.

Actually the major plant throughout the bakery is arranged in five production lines similar throughout, except for slight modifications according to developments in design as installation has proceeded. For convenience in presenting the article we have worded it as if we were describing one line of plant only, although we have given consideration to the most modern aspects.



Loaves are passed from the ovens to a slat conveyor in the dispatch room

The bakery installation is served from the public electricity supply at 415 V, three-phase, but in view of the present peak-load difficulties there have recently been installed two 55-kW MacLaren-Brush diesel-alternator sets which are capable of supplying all or any section.

We are indebted to Mr. W. J. Brookes, director and general bakery manager, for permission to inspect the installation and to publish this article, and to Mr. A. H. Bennett, chief engineer, for help in obtaining the information and photographs.

Water Power in Victoria

289,000-kW Scheme at Kiewa

THE Kiewa project, now being carried out by the State Electricity Commission of Victoria at a cost of £25 million, is centred on the Bogong High Plains—nearly 6,000 ft above sea level and 200 miles north-east of Melbourne. The plateau in winter is covered with snow to a depth of 10 ft, which melts in the early spring to swell the East and West Kiewa Rivers, which are to be trapped by two large dams 5,500 ft above sea level.

The larger dam, in Pretty Valley, will have a multiple-arched structure the foundations of which will be anchored 50 ft deep in granite, and will be 211 ft high with a crest ¼ mile long. There will also be three subsidiary dykes, one of them, Cope Dyke, 70 ft high and ½ mile long. The total capacity of this reservoir will be 44,000 million gal. The second reservoir in Rocky Valley, five miles away and 150 ft lower, will store 6,000 million gal. The combined flow will pass through a series of six power stations with a total capacity of 289,000 kW, each with its own dam to provide for independent operation.

To increase the head, five stations will be underground. From the first station near Pretty Valley reservoir to the last station in the chain there will be a drop in elevation of 4,309 ft. The only surface station is No. 3 (26,000 kW), near Bogong village, half-way between Pretty Valley and the last station; this has been in operation since 1944. The next station to come into operation will be No. 4, the last one in the chain, which in 1951 will develop 45,000 kW, reaching its maximum of 60,000 kW in 1953. In the same year No. 1 station (60,000 kW) will also begin operating. The last station to be completed (in 1956) will be No. 2 (90,000 kW), lying 620 ft underground.

Water flow from storages to power stations will be almost entirely underground. A total of 18 miles of tunnels, some 16 by 20 ft, will be driven through solid rock under the mountains. The largest tunnel will be the two-mile long tail-race (600 ft underground) to carry all water used in the scheme from No. 4 station into the regulating pondage, from which it will pass back into the West Kiewa River. This tunnel will deal with 34 million gal. an hour.

The 289,000 kW from Kiewa will partly relieve Victoria of dependency on coal from New South Wales. Victoria has practically no important black coal deposits, but possesses vast brown coal (lignite) deposits, mostly at Yallourn, 90 miles from Melbourne, where the State Electricity Commission has its main generating plant of 175,000 kW, to be increased to 300,000 kW. When the Kiewa project is completed and Yallourn has been extended, Victoria's capacity will reach 717,000 kW.

Views on the News

By REFLECTOR

IN last week's issue it was reported that Mr. W. J. Girvan, city electrical engineer of Belfast, had been invited to join the British Electric Power Convention Committee. This is a reminder that Mr. Girvan and Mr. R. V. Macrory of Londonderry remain "unnationalized." But there is a third municipal engineer who retains his freedom—Mr. C. Anderson of Douglas, Isle of Man. I see that in that happy isle the ban on the use of "fuel" for the purpose of advertisement has been removed and the entertainments manager of Douglas is now arranging the complete neon lighting of the Villa Marina.

✦ ✦ ✦

That recent power cuts have been largely due to the switching-on of fires during the morning peak is probably true but in stating this the *Daily Graphic* says that it is "basically a coal problem." It goes on to contend that if coal was freely available people would not need to switch on electric fires at all. So far as I can judge there is no scarcity of domestic coal at the moment. Electric fires are used because switching them on is a very simple operation, in contrast with the lighting of a coal fire, which takes a long time to get going and, in summer time at least, is needed for a very short period.

✦ ✦ ✦

On this subject, again, a correspondent of another paper suggests that if electricity is scarce there should be no new connections or extensions. He says that gas is generally available and, anyway, many housewives are a little afraid of electric cookers. I maintain that nobody should be forced to use gas and I do not believe that electric cookers are so frightening as gas ovens, which occasionally explode quite violently when being lighted.

✦ ✦ ✦

Last Monday's television programme included demonstrations and explanations of their ideas by a number of inventors. A few days earlier these gentlemen were paraded for interview by the Press and they disclosed a number of ingenious developments—mostly practical but some more amusing then useful. I attended and much enjoyed this "pre-view." Only one or two items were electrical. The most reasonable was an orchard heater shown by Mr. S. J. Alavoine of Buckhurst Hill, Essex. This consisted of a thermostatically controlled 750-W coiled element on a substantial refractory cone mounted in a vertical copper sleeve with an asbestos jacket, the whole being contained in a galvanized-sheet cylinder about 2 ft 6 in. high and 9 in. in diameter. The inventor claims that the circulation of warm air from this is effective in preventing frost on fruit trees within a 12-yd radius. Circulation can be assisted by a small fan in the base, if desired. The main drawback is the amount of three-core c.t.s. cable needed if the orchard is, as is usual, distant from a supply point.

✦ ✦ ✦

Helpful suggestions are never lacking in emergencies. A letter in the *Daily Graphic* proposes the erection of small power plants on all new estates and half-a-dozen small water-turbine installations on the banks of the Thames at intervals to help London's supply. Even as an emergency measure it is hard to contemplate the breaking-down of our electricity supply system in this way after the work which has been put into its integration.

✦ ✦ ✦

Electricity consumers are naturally not pleased that their bills are going up but they can derive comfort from the fact that electricity is one of the few "commodities" which until a short time ago continued to become ever cheaper. The Coventry treasurer in a preface to the abstract of the city's accounts for 1947-48 mentions that in 1896 the cost of electricity in Coventry was 5·85d. per kWh; in 1947-48 it had fallen to 0·94d. per kWh. This fall occurred in spite of the rise in the cost of coal from 5s. to £2 7s. a ton.

✦ ✦ ✦

It is harder to evict a tenant than to cut off his electricity and this is probably why Bristol Corporation finds it difficult to collect the rents of some of its tenants although these people pay up for their electricity. To ease the situation, according to a *Daily Express* report, the Corporation has asked the South Western Electricity Board to substitute shilling-in-the-slot meters for the present quarterly type.

Correspondence

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Impregnation Plants

IN your issue of 13th August "L.E.S." comments on the article which you published on 30th July dealing with the above subject. He expresses the view that non-vacuum methods can produce results in every way equal to those obtained by the more elaborate process.

We suggest that this broad statement is misleading if it is intended to apply to all types of components and conditions of subsequent usage. As the makers of the particular impregnation plants described in your journal, we can assure "L.E.S." that the demand to-day is even greater than during the war when it was stimulated by the various Service Departments insisting on the process for many of their contracts.

We can think of only one good reason why experienced manufacturers should install this more elaborate process quite voluntarily—because it does ensure the best results and enhances the reputation of their products.

BARLOW-WHITNEY LTD.,
*London, N.W.*10. H. D. BARLOW, A.M.I.E.E., *Managing Director.*

F.H.P. Motor Production

YOUR leaderette of 20th August with regard to f.h.p. motor production was unquestionably correct as to the considerable delay, until comparatively recently, in the completion of many types of motor-driven machinery through the apparent lack of f.h.p. motor supplies. It was equally accurate in stating that production was now much easier, with encouragement by the Ministry of Supply to export.

The true state of affairs of the past and present f.h.p. motor position, however, has not been divulged. This should be clarified by the following facts:—(*a*) Considerable over-ordering by most buyers in the past, to the point of desperation, so as to ensure continuity of f.h.p. motor supplies for their own needs. This caused the Ministry of Supply to get the false impression that all was not well with existing f.h.p. motor production, and high priority was given to the building of many new small-motor factories. (*b*) The chaotic demand for f.h.p. motors by oil burner manufacturers suddenly ceasing practically overnight. (*c*) Economic policy of the Ministries in closing the door to domestic uses of f.h.p. motors. (*d*) Large stocks piling up with many machinery manufacturers, and other re-sellers, who were unable to cancel all their orders. (*e*) Catching up by f.h.p. motor makers in their orders against a rapidly decreasing demand by an overwhelming step-up in their production.

It is to be hoped that the small-motor position does not now follow the way of electric fires and radio, but that temporary overproduction will find an outlet in the export market.

Sutton Coldfield. G. C. SOFIANO, M.Am.I.E.E., Associate I.E.E.

Recognition of Contractors

I AGREE with Mr. Gazard that doctors, dentists, architects, etc., are not all above criticism, but they at all events have to pass a stiff examination before being allowed to practise. If electrical contractors and their operatives had to do likewise there would not be so many disreputable electrical installations as there are in this country. However, the authorities have not seen fit to introduce compulsory licensing of contractors and their operatives, so other means must be found to raise contracting to a higher level.

As I have already pointed out, the E.C.A. is principally a trade association and has done a great deal of good work for its members but it certainly has never got to "proper grips" with bad installation work. Mr. Gazard seems to think that if a member of the E.C.A. was expelled for bad work, he would be put out of business, but that is open to doubt. I agree that expulsion from the Register would not be a great calamity, but isn't it a great pity that that is the case? He also asks me to suggest means of making the Register a "powerful influence for good." I have already indicated a step in the right direction, namely, that all bona-fide contractors shall become registered, after which "ways and means" will be easier to suggest.

Glasgow. ALEX MILNE, SENR.

Welding Equipment for Denmark.—A report on the Danish market for welding equipment and arc welding electrodes has been prepared by the Export Promotion Department, Thames House North, Millbank, London, S.W.1.

British Television Policy

Post Office Announcement

THE London television station at Alexandra Palace will continue to operate for a number of years on the 405-line system which is also being adopted for the Midlands station and is proposed for other British stations. This was announced in a Government statement of policy on Tuesday last.

The 405-line definition and other technical characteristics, including the latest developments of the B.B.C. television broadcasting system, have recently been examined by the Television Advisory Committee under the chairmanship of Lord Trefgarne. On its advice the Postmaster-General has authorized preparatory work on further extensions using this system. He considers that the improvements in quality of picture noticeable to the ordinary viewer in any of the systems in use abroad and those with which British manufacturers have experimented are very slight and not sufficient to justify a change which would make all the present British receiving sets obsolete. Moreover, any change of system of this character would prejudice more substantial improvements at a later date, which might include colour. Such developments need prolonged further research before they can be realized in practice and so far as can be foreseen this will take several years.

Work on the Midlands station is being pressed ahead and it is hoped to open it in the autumn of next year. Although working on the same basic system of 405 lines, as at Alexandra Palace, the station will incorporate various improvements. The power of the vision transmitter will be twice as great and that of the sound transmitter four times as great. The frequencies will be about 60 Mc/s.

The station which is being built at Hill Village, Sutton Coldfield, will have a mast 750 ft high to support a new improved design of transmitting aerial. The range cannot be predicted exactly and will vary slightly in different directions but will be approximately 50 miles and it is expected that some six million people will be within the range of the new station. The Post Office is providing alternative radio and cable links to take the programmes from London to Sutton Coldfield.

The B.B.C. is working out proposals for further television stations on the 405-line system so as to make television ultimately available to the greater part of the population. It is intended that the next station shall be in the north of England, but it cannot be foreseen when work on this station will be started.

The statement was welcomed by the Radio Industry Council at a press conference when it was claimed that the British system was the best engineering compromise between maximum picture quality and minimum cost of production. American journalists covering the Olympic Games had remarked upon the superior quality of the British picture.

The industry was working up production, the target being to produce 500,000 receivers in the next three years. In September the Council was giving its first television demonstration abroad at the Copenhagen Exhibition. Adoption of the British system as the standard in Europe would meet all the requirements for the economic development of television.

Increased Prices

Board Chairmen's Statements

DETAILS of increases in charges in the area of the Southern Electricity Board were given at a press conference on Tuesday last by the chairman, Mr. H. Nimmo. Referring to the recommendation of the British Electricity Authority that the running rate of two-part tariffs should be not less than 0·75d. per kWh, he said that the price of coal in the area of the South Wales Board was 40s. 6d. a ton and in the Southern Area 65s., which represented a difference in cost per kWh bought at 33 kV of 0·21d., and at low voltage of 0·24d. Therefore if 0·75d. was the correct charge where coal was cheapest, the equivalent figure in the Southern Area, where coal was dearest, was 0·99d. They were determined to effect technical improvements and economies in administration, and had sufficient confidence in this to make the minimum running rate in the area not 0·99d. but 0·875d. This minimum would apply to all two-part tariffs and the secondary rates of block tariffs and all special flat rates in which the unit rate was not already subject to adjustment by means of a coal clause. At the same time the Board was increasing all flat rates for heating and cooking which were at present below 1·75d. to that figure and all flat rates for water-heating would be brought up to 0·75d.

There was one other alteration which was to reduce the lighting flat rate to 6d. for " credit " consumers and 7d. for prepayment-meter consumers where the rates were higher.

Mr. J. S. Pickles, chairman of the South-West Scotland Board, spoke of the new tariffs at a press gathering in Glasgow on 18th August. He pointed out that Glasgow would still have the cheapest tariff in the area because the primary rates were the lowest. In the Board's area the increased revenue would amount to about £450,000 in a full year. The increases had nothing to do with nationalization; the economic position could not be ignored. The increases take effect from the meter readings after 30th August. Existing running charges in the area range from 0·5d. to 0·7475d. (in Glasgow and Rutherglen there is a secondary rate of 0·4d. after the initial 0·6d.).

The South-East Scotland Electricity Board has also announced increases. In nearly all cases for the areas covered by the former Bo'ness, Edinburgh, Falkirk and Kirkcaldy Corporations, the increases are from 0·5d. to 0·75d. per kWh (in a few instances the former rate was 0·625d.).

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Eastern Division of the British Electricity Authority states that **Mr. F. H. Bond** has been appointed assistant power station superintendent at the Bedford station where he was previously charge engineer. At the Watford generating station **Mr. L. P. Float** has been promoted from senior charge engineer to assistant power station superintendent. In the Technical Department at Divisional Headquarters **Mr. N. Neal,** previously engineer in the Research Branch of the G.P.O., has been appointed communications engineer. The following have been appointed section heads in the Accountants' Department: **Mr. E. Whittaker,** A.L.A.A. (previously accountancy assistant, Northmet Power Co.); **Mr. J. D. Scott,** C.A. (previously second assistant accountant, C.E.B. (East and South-East England)); **Mr. F. Mosley,** A.L.A.A. (previously chief clerk, Watford Corporation Electricity Department); and **Mr. F. E. Reeve,** section head, group (formerly chief commercial assistant, Ipswich Corporation Electricity Department).

Mr. C. E. Ball, ASSOCIATE I.E.E., A.AMER.I.E.E., at present assistant district engineer (Leighton Buzzard) with the Eastern Electricity Board, Luton District, has been appointed distribution engineer with the São Paulo Tramway, Light & Power Co., a subsidiary of the Brazilian Traction, Light & Power Co., Ltd. During the war Mr. Ball served as an electrical lieutenant in the R.N.V.R.

Mr. W. G. Stiles, F.C.I.S., who since 1920 has been secretary of the Cable Makers' Association, retired at the end of last month at the age of sixty-five. Mr. Stiles joined the staff of C.M.A. in 1904, and practically the whole of his working life has been spent in its service. In addition to his position as secretary of the Association he was for several years, up to the time of his retirement, secretary of the majority of the Constituent Councils which have now, as recently announced, been reconstituted as autonomous affiliated manufacturers' associations, as well as of the Joint Industrial Council for the Electrical Cable-making Industry and some of the specialized "categories" of the Insulated Conductors Export Group.

Mr. W. G. Stiles

Mr. A. F. Bulgin, chairman and managing director of A. F. Bulgin & Co., Ltd., has recently been promoted to the rank of wing commander in the Training Branch of the R.A.F.V.R. and will now command West Essex Wing of the Air Training Corps. He has taken an active interest in the A.T.C. since its formation in 1941 and was awarded the M.B.E. (Military Division) in 1946.

Mr. N. Elce, M.SC.TECH., M.I.MECH.E., has been appointed assistant chief mechanical engineer of the Metropolitan-Vickers Electrical Co., Ltd., which he joined as a college apprentice in 1920 (receiving his technical education at the Manchester College of Technology). In 1922 he was attached to Mr. (now Dr.) H. L. Guy's staff and undertook steam nozzle and blade research work. From 1926 until 1941 he was responsible for the company's industrial turbine applications and latterly also for marine turbines. During the war the company formed a new section for special work (under the D.S.I.R.) in connection with the military use of atomic energy, and Mr. Elce visited the United States as a member of the British team under Sir Wallace Akers. He also served with the M-V unit of the Home Guard, becoming its C.O. In 1944 he was appointed assistant to the chief mechanical engineer, Mr. K. Baumann, with particular interest in power developments and staff training. He is a member of the A.E.I. Engineering Committee; joint chairman, with Mr. R. H. Collingham (B.T.H. Co.), of the A.E.I. Joint Turbine Group Committee; an honorary consultant to the Department of Atomic Energy; and a member of the Thermo-Dynamics Committee of the Mechanical Engineering Research Board of the D.S.I.R. Mr. Elce, who is at present in the United States, has also visited Finland, Russia, Egypt, Germany and Switzerland on the company's behalf.

Mr. N. Elce

Mr. L. J. Pearson, managing director of Lewis Berger & Sons (Australia) Pty., Ltd., has arrived in this country by air from Sydney and will be in England for some weeks. Before taking up his Australian appointment in 1945, Mr. Pearson was managing director of Lewis Berger (Scotland), Ltd.

Miss Peggy Cooper, the eldest daughter of Mr. A. R. Cooper, M.I.E.E., divisional controller for the Merseyside and North Wales Division of the British Electricity Authority, was married on 18th August, at Chelsea, to Mr. F. D.

Websper. The bridegroom, after service in the Fleet Air Arm, is studying electrical engineering at Kingston.

In the accompanying photograph taken during the **Duke of Gloucester's** recent visit to the "Darkness into Daylight" exhibition at the Science Museum, South Kensington, His Royal Highness is seen with Dr. H. Shaw, director of the Science Museum (left) and Dr. J. N. Aldington (director of research at the Preston laboratories of Siemens Electric Lamps & Supplies, Ltd.) examining an exhibit of lighthouse lamps. On the extreme left is the first parabolic reflector used for lighthouse purposes, the light source being a sperm oil lamp. Next to this there is one of the original carbon arc lamps developed for lighthouse use, including an automatic feed mechanism. The three filament lamps are all of special design, some of them being used by Trinity House for lighthouse work.

The Duke of Gloucester at the "Darkness into Daylight" exhibition

Mr. G. C. Handley is leaving the English Electric Co., Ltd., on 31st August to take up the position of industrial sales manager with Worthington - Simpson, Ltd. He was apprenticed to the English Electric Co., leaving later to gain experience in the Worcester power station, with the American Westinghouse Co. at Detroit, the Hydro-electric Power Commission of Ontario, and the Standard Oil Co. of New Jersey, in whose service he became chief electrical engineer at the Telara plant in Peru. Returning to the English Electric Co., Mr. Handley, after a period at Bradford, became industrial applications engineer in the company's London branch office.

Mr. G. C. Handley

Major H. E. Watterson, M.I.E.E., has returned from Shanghai where he has been attached to the Ministry of Communications as consultant and adviser, U.N.R.R.A. Mission in China. At the outbreak of the war Major Watterson, then with Marconi's, was commissioned in the Royal Corps of Signals, posted as G.S.O.2 to Radio Security M.I.8, being transferred subsequently to S.O.E. and serving with the Special Forces overseas. At the end of 1942 he was appointed first secretary (commercial) at the British Embassy, Chungking, where he remained until VJ Day.

Obituary.—We learn that **Mr. Harold Watson,** A.M.I.E.E., died on 13th August. Mr. Watson was connected with the old Holland House Manufacturing Co. at its inception, and eventually became managing director of the Holland House Electrical Co., Ltd., wholesalers; he retired in 1946.

Electricity Commissioners' Returns

THE return of engineering and financial statistics relating to electricity supply in Great Britain for the year 1945-46, compiled by the former Electricity Commission, has become available from H.M. Stationery Office, price 21s. A similar volume for the year 1946-47 will be published in due course.

The return, which is in the same form as previous ones, gives particulars of systems of supply, generating plant, maximum loads, load factors, energy generated, purchased in bulk and sold, with numbers of consumers for each statutory undertaking. The financial statistics include particulars of capital, revenue from different sources and classes of consumers and working expenses.

During 1945-46 there was a net increase of 176,000, or 1·6 per cent, in the number of consumers, the total being over 11,005,000. Sale of energy amounted to 31,684 million kWh, being a decrease of 837 million kWh, or 2·6 per cent, compared with 1944-45. In the same period the sale of electricity for lighting, heating and cooking rose to 12,337 million kWh, an increase of 10·3 per cent, while power sales dropped to 17,899 million kWh, a decrease of 11·1 per cent.

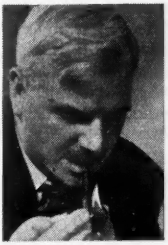
I.E.E. Section Chairmen

BRIEF BIOGRAPHIES

THE new chairman of the Measurements Section of the Institution of Electrical Engineers is **Dr. S. Whitehead,** M.A., director of the British Electrical and Allied Industries Research Association. He obtained his M.A. degree at Jesus College, Oxford, and Ph.D. degree in electrical engineering at London University. Joining the E.R.A. in 1925 after a year's research at Clarendon Laboratory, Oxford, under Prof. Lindemann, he became assistant director of the Perivale Laboratory in 1938, assistant director of E.R.A., in 1944, acting director in the following year, and director in 1946. During the war he was concerned with special work on bomb and mine location and disposal, interference suppression, radio component problems, and electrical equipment of armoured vehicles. He has served as chairman of various B.S.I. and I.E.C. committees; deputy chairman of the British National Committee of C.I.G.R.E.; member of the Board of the Institute of Physics; and member of the Management Committee of *Science Abstracts* and of the editorial panel of the *Journal of Scientific Instruments*. Besides his three-volume work on "Dielectric Phenomena" he has been author or part-author of about thirty papers.

Dr. S. Whitehead

Mr. C. O. Boyse



Mr. R. O. Ackerley

Mr. F. Smith

Mr. C. O. Boyse, B.SC.(ENG.), M.INST.C.E., chief civil engineer, B.I. Callender's Cables, Ltd., is chairman of the Transmission Section. Born in 1904 and educated at Whitgift School, Croydon, and at London University, he started with Callender's in 1924 in the Overhead Department, his early work including a year in India on the electrification of suburban railway lines at Bombay. In 1929 he took charge of the company's Overhead Line Design Department and in 1942 became manager of the Civil Engineering Department. Following the merger with B.I. Cables in 1945 Mr. Boyse was appointed to his present position and he is now responsible for the direction of all business for overhead lines, railway electrification, radio structures, etc. Actively engaged in overhead line research problems for many years, he is at present associated with work on overhead line regulations, a British Standard Code of Practice for overhead lines, and wind power generation. A paper of which he was the joint author, "The Problem of Conductor Sagging on Overhead Transmission Lines," which was read before the I.E.E. Transmission Section in 1943, was awarded the John Snell premium.

Mr. R. O. Ackerley, manager of the Illuminating Engineering Department of the General Electric Co., Ltd., has been elected chairman of the Installations Section of which he has been vice-chairman since October, 1946.

Mr. Ackerley joined the G.E.C. in 1919; he had served throughout the 1914-18 war and won the Military Cross. While a scholar of Eton, he won a scholarship to Oxford, but was prevented by the war from taking it up. From 1924 to 1929 Mr. Ackerley was in the service of the G.E.C. in South Africa, and in 1931 was appointed manager of the company's Illuminating Engineering Department in London. He is a past-president of the Illuminating Engineering Society, and represents that Society on the National Codes of Practice Committee. Mr. Ackerley has made a substantial contribution to the literature of illuminating engineering, and in 1945 was awarded the I.E.E. Crompton Premium for a paper on "Some Factors Affecting the Design of Electric Lighting Installations for Building Interiors."

Mr. F. Smith, O.B.E., who has been elected chairman of the Radio Section, has been manager of the M.O. Valve Co., Ltd., for the past twenty-five years. He was educated at Aldenham and Faraday House and served as a pupil at the Witton Works of the General Electric Co., Ltd., being transferred to the Osram Lamp Works on the introduction of the metal filament lamp. Mr. Smith was president of the Faraday House Old Students' Association from 1939 to 1946.

Phase-Sequence Tests

Lamp-Indication Methods

By G. W. STUBBINGS, B.Sc., A.M.I.E.E.

THERE are many ways of determining phase sequence, which is an important characteristic of a three-phase supply, first because it determines the direction of rotation of an induction motor, and, secondly, because in the connection of a three-phase meter the leading and lagging phases must be associated with the correct meter elements. If the power in an approximately balanced three-phase load of lagging power factor is measured by one or more wattmeters, the phase sequence can be inferred from two instrument readings. Simpler methods depend upon lamp indications, and are based upon the principle that if two resistance components and one reactive component are connected

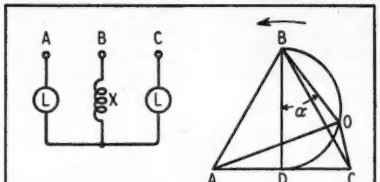


Fig. 1

in star to a three-phase supply, the voltages on the components depend upon the phase sequence as well as upon the ohmic values of the components.

The best known method of testing phase sequence in this way is illustrated in Fig. 1, which shows a star connection of two lamps of equal wattage, L and L, with a reactor X. In the vector diagram D bisects the side AC of the voltage-vector triangle ABC so that DA and DC are the lamp voltages when the reactor is disconnected. According to Thevenin's theorem the reactor voltage when it is connected is the same as if it were joined to a source of voltage represented by the vector BD, in series with a resistance equivalent to that of the two lamps in parallel. The point O which gives the vector OB of the reactor voltage must therefore lie on the semicircle BOD constructed on and to the right of BD, and the characteristic angle α = DOB is given by the relation tan $\alpha = R_P/X$, where X is the reactor impedance and R_P the parallel resistance of the two lamps. The vectors OA and OB are those of the lamp voltages, and the lamp connected to the lagging phase is brighter than that connected to the leading phase. If a capacitor is used instead of a reactor, the semicircle in the vector diagram is drawn to the left of BD and the rule is that the dull lamp is associated with the lagging phase.

If a switch is included in the reactor branch of the test circuit, the phase sequence can readily be inferred even if the lamps are of unequal wattage. The vector diagram Fig. 2 shows this condition. DA and DC are the vectors of the unequal lamp voltages with the reactor disconnected. The semicircle containing the point O is drawn on BD, and it is seen that when the reactor is connected, the voltage on the lagging phase lamp always increases. If the point determining the star voltage takes a position like O_1, the voltage on the leading-phase lamp may increase also, but in this condition the lagging-phase lamp voltage will be the greater. Hence the rule: closing the reactor switch always makes the lagging phase lamp brighter; if the voltages on both lamps increase, the lagging phase lamp is the brighter of the two.

A drawback of the Fig. 1 test circuit for 400-V supplies is that the bright-lamp voltage may take an unduly high value. It is easy to see that the maximum value of this voltage occurs when its vector passes through the centre of the semicircle BOD, and a simple calculation shows that this maximum voltage is about 1·9 times the star voltage of the supply, which is dangerously high. A safer connection for 400-V supplies is as shown in Fig. 3, the reactor branch of the circuit being connected to the neutral or to earth. The maximum bright-lamp voltage with this connection is only about 15 per cent greater than the star

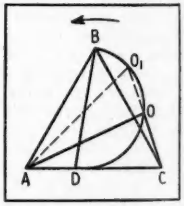


Fig. 2

voltage of the supply, and there is no danger of a lamp being burnt out. It is clear from the vector diagram that the test with this connection is not so sensitive as when the

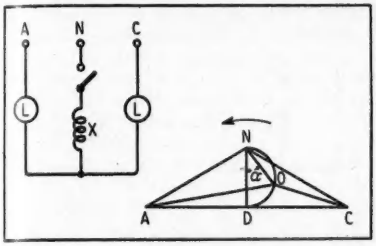


Fig. 3

circuit is joined to the three line terminals, because the difference of the lamp voltages is relatively smaller. Provided that the impedance of the reactor is not unduly high or low, this difference is sufficient, but the indication can be made more positive by using a switch in the reactor branch and observing the change of the lamp voltages when this switch is closed. With similar lamps, that connected to the lagging phase will get brighter and that connected to the leading phase will get duller.

Phase-sequence-test circuits requiring one lamp only are in some ways preferable to those requiring two lamps, because they are more easily portable. Fig. 4 illustrates one test circuit of this kind. R is a wire resistance and Z is a parallel combination of resistance and reactance which is so adjusted that its combined impedance is equal to the ohmic value of R, while its phase angle is 60 deg The vector diagram shows the voltages on the R and Z components when connected to two line terminals of a three-phase supply with the lamp disconnected. If the phase sequence is normal, the vectors of these voltages will be AE and EC, so that EN is the vector of voltage difference between the common junction of R and Z and the neutral of the supply. Current will flow in the lamp when it is connected and it will light at reduced voltage. If the phase sequence is the reverse of normal, the vectors of the voltage on R and Z with the lamp disconnected will be AN and NC and there will be no voltage difference between the common junction and the neutral terminal, and consequently no current will flow in the lamp when it is connected. The terminals of the circuit are marked "lagging" and "leading" as shown, and the circuit is connected to the supply in such a way that the lamp gives an indication. The phase sequence then corresponds to the terminal markings.

A more easily contrived circuit with one lamp only is shown in Fig. 5. Here R is a wire resistor and of approximately equal ohmic value to that of the reactor X. L is a lamp of any wattage. It has already been seen that if L is connected to the lagging phase it will always get brighter when the reactor switch is closed. It is not difficult to show that if the lamp is connected to the leading phase, closing the reactor switch will always reduce the voltage on it. The vector diagram for the latter connection is shown.

If the resistance of the lamp is n times that of the component R, then AD and DC are the vectors of the voltages on R and L with the reactor disconnected and DC = n × AD, so that DC/AC = n/(1 + n). The parallel resistance of L and R is n/(1 + n) times that of R, and as the ohmic values of

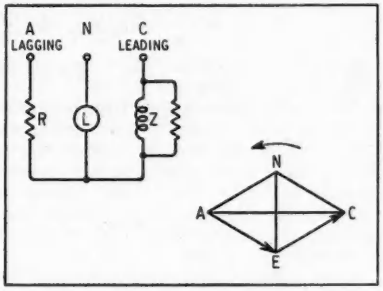


Fig. 4

R and X are equal tan α = n/(1 + n) = DC/AC. The point O can be located by drawing CL perpendicular and equal to AC, joining DL to cut the semicircle BOD in N, and drawing NK perpendicular to AC, cutting the semicircle in O. For α = DNK = DLC, and the tangent of DLC is DC/CL = DC/AC. Further, as the angles BDN and BON are equal, and BOD is a right angle, the angle ODC is equal to the angle BDN and the triangles BDN and ODK are similar. Also, as DC/DK = DN/DL the triangles DOC and DBL are similar, and the ratio of the lamp voltage DC with the reactor disconnected to its voltage OC when the reactor switch is closed is equal to DL/BL.

If the circuit is connected to the three lines

of a three-phase supply, the main voltage-vector triangle ABC is equilateral, BCL is 30 deg, and BC = CL. BL must therefore be less than CL and less than DL, so that OC is less than DC. If the circuit is connected to two line terminals and the neutral of a three-phase supply, BCL = 60 deg. As CL is greater than BC, CBL is greater than BLC, and, therefore, greater than 60 deg; BL is consequently less than CL and also less than DL, so that OC is less than DC.

If connection is made to line and neutral terminals of a two-phase three-wire supply, CBL is a 45 deg isosceles triangle and BL is less than CL and less than DL. Thus for all practical connections of the circuit of Fig. 5, provided that L and R are joined to line terminals, the lamp voltage will increase if it is connected to the lagging phase and will diminish if connected to the leading phase when the reactor switch is closed. The circuit is connected to the supply in such a way that closing the reactor switch makes

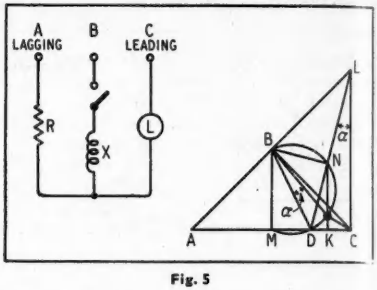


Fig. 5

the lamp brighter; the phase sequence is then in accordance with the terminal markings shown in the diagram.

Metallurgical Developments

Plating, Welding and Melting

By L. SANDERSON

An electrolytic process has been developed in the United States for the large-scale production of iron powder. The anodes are plates of ingot iron and the cathodes are of stainless steel. The electrolyte has an iron chloride base and the current density is approximately 25 A per sq ft. Energy consumption is approximately 0·75 kW per hr per lb of iron produced.

In the application of electrography to the examination of electrodeposits, a pad of folded paper is impregnated with a reagent and placed on the surface to be tested. A current is then passed through the metal and pad by touching the outer surface of the latter with a graphite rod, which is made the cathode, whereupon a coloured spot is formed on the pad. Imperfections in the deposits can thus be detected.

A non-destructive method of testing metal parts employs a magnetic testing apparatus known as the Der Mont Cyclograph. The Cyclograph possesses a range of frequency of 2,000 to 150,000 cycles. Frequency is controlled by the design of the test coil into which the parts to be tested are placed, their magnetic properties being compared with those of a standard part forming the core of a second coil.

Electrostatic separation has been developed in Sweden as a means of separating fine-grained materials by a high-voltage field. The conditions for effective separation are that the two materials differ physically, with a notable difference in their electro-physical properties. Electrostatic separation is not expected to replace flotation, magnetic or wet mechanical methods, but to act in combination to improve their efficiency.

Spectography is being considerably improved. Modifications of the equipment have increased the number of determinations that can be made in a specific period and have made it easier for the equipment to be operated by unskilled labour. The spectrograph and the major components of the spark source are enclosed in a safety hood. A motor drive is applied to the plate carriage of the densitometer and solenoid operation to the slit-head assembly. A rotary calculator has been developed for converting the density of the recorded spectra into the concentration of the alloying elements present. Another novel feature is an automatic exposure device for obtaining spectrograms of consistent density and the exclusion of personal errors from the results. A fixed pre-sparking period is followed by an exposure during which the light emitted

by the source is measured. When the amount of light emitted reaches a predetermined value, the source is extinguished.

A device for protecting a rolling-mill motor from excessive torque and heating, permitting the maximum utilization without abbreviating the service life of the machine, has been introduced. The control combines a magnetic relay for cutting off the current at a predetermined torque and a thermal overload relay which operates if a harmless overload is exceeded.

Flash-welding of hard-drawn high-carbon steel wire is a new development. The wire has a tensile strength of about 100 tons per sq in., and the resulting joints have 90 per cent of the strength of the basis metal. The cooling of the weld is arrested at 540 deg C, the wire being automatically maintained at that temperature in the flash-welding die until the austenite structure formed in the weld zone has transformed into the comparatively soft and ductile pearlite. Joints have been made on a production basis at rates in excess of one per minute.

Anti-Corrosion Plating

Nickel-zinc corronizing is a new process whereby a layer of nickel is electroplated on the parent metal, which may be either steel, brass or bronze, followed by a layer of zinc; the article is then heated to about 370 deg C to permit diffusion of the zinc and nickel. The main application of the process is to the protection of metals from attack by sulphurous gases. Selenium rectifiers for cathodic protection are another anti-corrosion development. Their suitability for the purpose is due to their high electrical efficiency, their adaptability to widely varying voltage and current requirements and their ability to operate for long periods without attention. They also provide d.c. with little interference from variations in temperature.

During the war equipment was developed in Germany for surface hardening armour plate by induction. A structure consisting of homogeneous martensite for a definite distance below the surface, with a gradual transition into the sorbite of the unaffected parent metal, was produced by low-frequency (40 to 600 cycles per sec) current. Plates up to 7 ft. wide, 24 ft. long, and 16 in. thick, received a hardened layer up to 2¾ in. thick at a rate of 8 in. per min.

A simple robust electrode holder for eliminating risk of shock during a.c. welding has a tough, insulating body and incorporates a contact-breaking mechanism which enables a full welding current of up to 300 A to be broken without severe arcing. The electrodes can be withdrawn and inserted only when the switch lever is in the safety position.

Investigation of the effects of gaseous atmospheres upon welding-arc characteristics and the properties of weld metal has indicated correlation between the hydrogen in the arc atmosphere, hydrogen content of the weld deposit and the incidence of underbead cracking in the alloy-steel basis metal. No cracking was found with atmospheres containing no hydrogen or when using lime-coated ferritic electrodes which evolved gases containing only 10 per cent of hydrogen. Metal arcs were comparatively stable in synthetic atmospheres of carbon dioxide and carbon monoxide, but the presence of even small percentages of hydrogen tended to make the arcs erratic. The atmosphere which gave the best welding characteristics was a mixture of carbon monoxide and carbon dioxide in equal proportions.

A process developed for applying a corrosion-resistant surface to ordinary low-carbon steel pipe and tubing employs extremely high current density, causing the depressions in the steel base to be more heavily coated than the high spots and adherence between nickel and steel so complete that the union is not broken during heating or bending. Welding electrodes of monel metal or 25-20 chromium-nickel steel are also a feature.

German Smelting Plant

An electric smelting plant erected in Germany consists of an electric pig-iron furnace complete with sintering, gas-cleaning, and pig-casting equipment. The furnace hearth is 27 ft. in diameter by 15 ft. 7 in. in height. The furnace is tapped every four hours, during which period approximately 8 tons of iron is produced. The amount of coke required for reduction is approximately 400 kg per 1,000 kg of iron, and the electricity consumption is 3,000 kWh per 1,000 kg of iron.

Electronic-frequency converting equipment is being employed in the United States for the production melting of alloy steels. A 300-kW equipment converts three-phase, 60-cycle current into single-phase, 1,000-cycle current, for use in two induction furnaces, each capable of melting 650 lb of alloy steel.

An electrically heated carbon-tube furnace is another development. The furnace may

be rapidly heated to 3,000 deg C or any lower temperature, and maintained within ± 20 deg C for several hours. At least half the resistor length provides uniform black body conditions, suitable for optical pyrometer calibration.

The characteristics of electric currents with wave lengths of 1 to 100 cm as sources of energy for dielectric heating are being investigated. Future fields of radio-frequency heating appear to lie in the annealing of wire, drying and curing of textile threads, and canning of food.

Automatic Furnace Control

In a new device for automatic furnace-temperature control a platinum resistance thermometer forms one arm of an a.c. bridge. The out-of-balance potential is amplified, limited and applied to the grid of an output pentode, the auxiliary grid of which is fed from an a.c. supply. The anode current of the pentode works a relay, which controls the furnace current. The instrument is said to be stable, portable and inexpensive. The temperature of the furnace can be controlled to within less than ± 0·5 deg C between 0 and 1,000 deg C. A simple method of slowly increasing or reducing the furnace temperature with time is also being adopted.

Developments in the electric melting of stainless steel include shortening the refining time by reboiling the bath at the end of the oxidation period, washing the refined basic steel with its own slag by re-ladling the contents of the tapping ladle into a second pouring ladle and making stainless steel by mixing a highly alloyed heat with a low-carbon virgin-metal heat. In a modern melting shop are two 55- to 70-ton electric arc furnaces fed from a 10,000-kVA transformer. The furnaces are of the swing-roof type, and a specially designed charger bucket allows admission of the entire charge in a single operation, reducing the time between tapping and switching on the power for the next heat to an average of about 12 min. The shell of each furnace is a single water-cooled steel casting, 17 ft. in diameter. The electrode regulators are of the rotary variable-voltage type, which give less mechanical wear and tear and have lower maintenance costs than balanced beam regulators.

Electrolytic Polishing

A new method of electrolytic polishing of metallic surfaces for making replicas for use with the electron microscope tabulates the solutions and current densities for brass, phosphor bronze, nickel, aluminium and stainless steels. Chilling is used to increase the pH range in which polishing can be effected. For chromium plating, carbon and graphite parts, the latter must be well cleaned and the strike applied at a high current density, the current being reduced as soon as the work is coated; good electrical contact with the carbon is necessary and the lead wires and all exposed parts must be stopped off.

In forced-air circulation electric furnaces, which are being used with ratings of from 6 kW to over 60 kW for temperatures in the region of 700 deg C, air is circulated over tubular metallic heating elements, past a thermocouple and the work, and then past a second thermocouple fitted at the bottom of the furnace between the work and the fan. When the temperatures registered by the two thermocouples coincide, the temperature of the charge is considered to have reached the desired value.

Another development is a rotary-hearth 175-kW electric furnace, having an output of 2,000 lb of alloy billets per hr at 800 to 900 deg C. The heating chamber is 1 ft. 4 in. wide by 1 ft. 6 in. high, and the annular hearth has a mean diameter of 5 ft. 9 in. A photo-electric cell controls the discharge of the billets.

New Lighting Association

AN organization entitled the Cold Cathode Tubular Lighting Manufacturers' Association has been formed. Its objects are to look after the interests of manufacturers of tubular discharge lighting and promote good understanding between them; to provide the Government, public bodies and others with facilities for consultation; to regulate relations between the members and between them and their customers and formulate conditions; and to promote high standards of production; and to engage in propaganda.

Membership is restricted to bona fide manufacturers of tubular discharge lighting with works in the United Kingdom or Northern Ireland. There are twelve original members, viz.: Ekco-Ensign Electric, Ltd., Austin Walters & Son, Ltd., Ionlite, Ltd., Neon Excelda Co., Campbell & Isherwood, Neon Signs (Ulster), Ltd., Duralite, Ltd., Thorn Electrical Industries, Ltd., Signcrafts, Ltd., Electrolumination, Ltd., Northern Electrics, Ltd., and Neo-Chrome, Ltd. The chairman is Mr. J. F. Aldridge (Electrolumination), the vice-chairman, Mr. J. E. Clark (Ekco-Ensign) and the secretary, Mr. A. J. Barsham, B.COM., F.C.A.; the offices are at 1, Lincoln's Inn Fields, London, W.C.2.

COMMERCE and INDUSTRY

Turbo-alternators for Canada. Power for Siam.

IT is generally recognized that many hydro plants need thermal power stations for part-time use, particularly at peak load periods. The first steam power plant on the Ontario hydro-electric system will be constructed at Windsor, and the Hydro-Electric Power Commission of Ontario has placed an order in Great Britain with the English Electric Co., Ltd., for the first two 60,000-kW turbo-alternators. The sets will run at 3,600 r.p.m. and the alternators will generate at 13,800 V, 60 cycles. Steam conditions at the turbine stop valves are 850 lb per sq in. and 900 deg F. The turbines are of the two-cylinder, impulse-reaction type. These will be two of the largest steam generating units ever used in Canada.

Purchase Tax on Lighting Fittings

The Commissioners of Customs and Excise state that where electric filament lamps or fluorescent lighting tubes are sold in conjunction with lighting fittings, the lamps and the fittings are regarded as separate articles for tax purposes.

Key Industry Duty Exemptions

The Safeguarding of Industries (Exemption) (No. 7) Order, 1948 (S.I. 1948 No. 1811) continues until 31st December, 1948, with certain additions and deletions, the exemption from key industry duty of articles so exempted under previous Orders which expired on 19th August. A number of items exempted as from 1st January, 1948, in order that reduced rates of duty might be imposed under the Import Duties Act, 1932, again become subject to key industry duty at the reduced rates imposed under the Import Duties Act. They include cinematograph projectors and arc lamps therefor (33⅓ per cent), and piezo-electric quartz plates, bars and rods (10 per cent), as set out in the Safeguarding of Industries (Reduction of Rates) Order, 1948 (S.I. 1948 No. 1815).

Siamese Power Concessions

H.M. Representative at Bangkok reports that applications have now been invited for concessions for the construction and operation of electric power stations in Siam. Inquiries can be made at, and questionnaire forms in the Siamese language obtained gratis from, the Department of Public and Municipal Works (Electric Division), Ministry of the Interior, Bangkok. The Department state that completed applications in respect of a power station in Bangkok should be returned to them, but that proposals for power stations in the provinces should be addressed to the relevant Changvad (Provincial) Commissioner. The receiving authority will then refer to the Ministry of the Interior. No time limit for applications has been set.

Concessionnaires will be required to provide their own capital or float a company. The questionnaire covers such matters as the length of the concession, the size of plant, charges, etc.

Electric Car Demonstration

Resulting from a promise made at the annual luncheon of the Electric Vehicle Association, the Wilson electric coupé was recently demonstrated in London to Lord Citrine who drove the vehicle with Mr. H. Nimmo, chairman of the Southern Electricity Board, and Mr. C. W. Marshall, deputy chief engineer (research) of

Lord Citrine inspects the Wilson electric coupé

the British Electricity Authority, as passengers. The vehicle was purchased by the Ealing Corporation in 1938 for use by the staff of the Consumers' Engineer's Department and was continuously used until it was damaged in the 1941 raids. Shortly after the war the vehicle was repaired and recommissioned for its original purpose. The car has a range of approximately 40 miles, a top speed of between 28 and 30 m.p.h. and to date has travelled over 25,000 miles. It has now been taken over by the Southern Electricity Board.

Government and Industry

The organization and work of national consultative bodies and the co-operation between the Government and both sides of industry are surveyed and explained in "Government and Industry," a directory in booklet form for industry, prepared by the Central Office of Information (H.M. Stationery Office price 9d. net). It lists and explains the functions of bodies which are concerned with national economic planning problems, such as the Economic Planning Board and the National Production Advisory Council, and then deals

with organizations (e.g., the Fuel Efficiency Committee and the Iron and Steel Board) concerned either with problems common to all industries or with those of particular industries. Addresses are given to which inquiries may be sent, together with addresses and telephone numbers of regional offices.

Salvage Drive in Birmingham

One of the biggest industrial salvage campaigns yet launched is scheduled for the Birmingham district from 27th September to 2nd October. Scrap metal of all kinds will be included in the "clean sweep" which industrialists are asked to apply to their plants; the emphasis, however, will be on ferrous scrap and waste paper. Mr. J. J. Gracie, chairman of the Midland Industrial Salvage Advisory Council (and general manager of the Witton group of engineering works of the G.E.C.), is appealing to all works, big and little, to make the campaign a success. The Regional Recovery Office, Board of Trade, C.M.L. Building, Great Charles Street, Birmingham, is to be the headquarters for the campaign.

Contract Price Adjustment Formulæ

The latest figures for use in connection with the B.E.A.M.A. contract price adjustment formulæ are as follows: Rate of pay for adult male labour, 14th August: 110s. (unchanged). Board of Trade index figure for intermediate products, 14th August: 250·5, being the figure for July (against 250·9 for June).

Large Transformer's Journey

The accompanying picture shows a 45,000-kVA transformer for the grid leaving the works of Bruce Peebles & Co., Ltd., Edinburgh, upon its 300-mile road journey to Huddersfield where it is to be installed. The total weight of the complete unit, including 7,800 gallons of oil, is 110 tons and it is 32 ft long, 20 ft wide and 21 ft high.

The transformer, without cooling equipment, weighing 75 tons, was transported on a special trailer. A wide detour had to be made by way of Carlisle to avoid the flood areas in South-East Scotland and the Border, and six days were required to complete the journey. Two 240-h.p. diesel tractors were used, one in front and one behind the trailer, with intercommunicating telephone. The assembly measured 100 ft from end to end and weighed about 150 tons. Preliminary arrangements for the route had to be made with no fewer than twenty road authorities.

Bruce Peebles transformer commencing its journey to Huddersfield

Royal Lancs Agricultural Show

The electricity stand organized by E.D.A. in conjunction with the North-Western and the Merseyside & North Wales Electricity Boards at the Royal Lancashire Show, Burnley, combined an attractive frontispiece to the marquee with an interesting and carefully planned interior. Models of grass drying and hay-curing plants were special features in a comprehensive display of electrical equipment for the farm, market garden and home. For the poultry farmer there was a display of electrical incubators and brooders, together with continuous demonstrations of egg grading and packing, while a varied collection of portable tools and a practical welding demonstration were provided for the benefit of the industrial visitor.

An all-electric kitchen of unit construction, while still on the "export only" list, gave the housewife a glimpse of the kitchen of the near future. Excellent weather drew thousands of people to the Show and about three hundred inquiries were received.

N.Z. Electro-Medical Apparatus Market

Although the population of New Zealand is small, the provision of free medical facilities has increased the demand for electro-medical apparatus and the market is relatively large. It is reported by the United Kingdom Trade Commission in Wellington that there is no local production except of infra-red therapy appliances for domestic use, and in that case the elements are mostly imported from the United Kingdom. Ten years ago the U.K. met only a small part of the demand. It appears that to-day about 80 per cent of the orders for new plant are placed in this country, but in view of the preponderance of Australian and United States products among

existing plants those countries obtain a large share of orders for spares, replacements and accessories.

United Kingdom products are reported to have captured the promising market of apparatus for mass radiography, while British ray-therapy appliances as well as radio-encephalographs are understood to meet no serious competition; in the case of deep-therapy machines and dental X-ray plants supply difficulties have been the limiting factor. The portable X-ray apparatus mass-produced in the U.K. for service requirements is stated to be not very popular and U.K. products have little share in the market for short-wave diathermy machines and virtually none for cardiographs, stimulators and audiometers.

Electricity Economy and Food

Advertisements which have been appearing in newspapers in the Eastern Electricity Area this month link electricity economy with food production. One of them points out that a unit of electricity wasted by leaving a small fire switched on would have been enough to milk twenty-two cows. The common slogan accompanying all advertisements is "Farmers Need Electricity to Produce More Food."

Eastern Board at Horticultural Show

The exhibit of the Eastern Electricity Board at the Friern Barnet Horticultural Show held from 19th to 21st August at Friary Park, London, N., struck a new note in its design. It consisted of a garden layout and a greenhouse stocked with seedlings in various stages of growth and equipped with electric soil- and space-heating apparatus. Nearly every kind of modern electrical appliance available to assist horticulturists was on view, an electric hedge-trimmer attracting particular attention. Leading from the greenhouse and following the theme of "From Kitchen Garden to Kitchen" was a well-planned area showing examples of electrical appliances such as cooker, refrigerator, washing machine, wash-boiler, etc. Some 7,000 people visited the show.

Section of the Eastern Electricity Board's display at Friary Park

Liquid Fuels Conference

Modern applications of liquid fuels is the subject of a conference to be held jointly by the Institute of Petroleum and the Institute of Fuel at the University of Birmingham (21st to 23rd September) simultaneously with an exhibition of control equipment and instruments to be displayed by a number of the leading manufacturers.

There will be morning, afternoon and evening sessions at which addresses, lectures and papers will be delivered on the uses of oil fuels in the iron and steel, non-ferrous metals, glass, ceramics and pottery industries; for agricultural drying processes; and for gas making.

Gas turbines for land and marine power purposes will be dealt with under the chairmanship of Dr. H. Roxbee Cox (Ministry of Fuel and Power). Gas turbine combustion problems are the subject of a paper by Messrs. I. Lubbock and I. G. Bowen (Shell Petroleum Co., Ltd.). Diesel engines and their fuels will be dealt with by Mr. P. N. Everett (Anglo-Iranian Oil Co., Ltd.) and Diesel railway traction by Mr. F. H. Horner (English Electric Co., Ltd.).

Non-Ferrous Metal Statistics

Earlier in the year the formation of the British Bureau of Non-Ferrous Metal Statistics was announced. The Bureau has now issued the first of its monthly bulletins. This contains details of production, consumption, exports and imports, and stocks of copper, zinc, lead, tin, antimony and cadmium. The annual subscription is ten guineas and the address of the Bureau is 132, Hagley Road, Birmingham. The bulletin shows, among other things, that the gross output of copper and alloy products in the United Kingdom in June was 356,083 tons (net copper content 284,826 tons) of which high-conductivity products represented 107,523 tons.

The consumption of lead by the cable-making industry during the first half of this year was 56,216 tons (compared with 44,100 tons in the first half of 1947).

Arbitration Award

National Arbitration Tribunal Award No. 1128 (H.M. Stationery Office, 1d.) deals with a claim on behalf of adult male workers employed in the tube finishing department of the General Electric Co., Ltd., Wembley. The workers contended that their minimum rate of pay should not be less than that of adult male tube gaugers. The tribunal's award was that the minimum rate should be ½d. an hour below that applied to the tube gaugers.

I.M.E.A. Convention Report

A complete record of the 1948 Convention of the Incorporated Municipal Electrical Association at Eastbourne is being published shortly. Copies of the proceedings, price 13s. post free, may be ordered from Mr. J. W. Simpson, British Electricity Authority, British Electricity House, Great Portland Street, London, W.1. Applications for copies should be made as soon as possible, but money should not be sent with the orders.

Argentine Ambassador at Trafford Park

On 6th August Ing. Don Juan Jose Vistalli, Ambassador Extraordinary and Technical Adviser to the Presidential Committee of the Argentine Republic's five-year plan, visited the works of the Metropolitan-Vickers Electrical Co., Ltd. He was accompanied by Mr. P. H. Dorchy, M.B.E., H.M. Embassy, Buenos Aires, and Mr. G. Mould, O.B.E., Central Office of Information. The Ambassador, who was welcomed by Mr. K. Baumann and Dr. C. Dannatt (directors of the Company) and Mr. F. J. E. Tearle (director of Metropolitan-Vickers Electrical Export Co., Ltd.), spent the morning touring the main manufacturing departments and meeting various senior officials.

Iron and Steel Control

The Minister of Supply has made the Control of Iron & Steel (No. 66) Order, 1948 (S.I. 1948 No. 1913, H.M. Stationery Office, price 1d.), which came into operation on 23rd August. The Order amends some maximum prices, the principal alterations being increases in the maximum prices for pig iron, heavy steel products, alloy steel billets and silico-manganese billets, rods, bar and wire, and increases in the extra charge for heat treatment of alloy and bright steel.

Pierhead Radar Installation

A marine radar station has recently been erected on the promenade deck of Southend Pier by Henry Hughes & Sons, Ltd., for the purposes of research work and the instruction of engineers and ships' officers. Apart from the research station, an auxiliary display unit has been installed to provide the general public with its first glimpse of radar in operation. The use of this display was formally given to the Mayor and Corporation of Southend on Monday last by Mr. A. B. G. Potter, joint managing director of Henry Hughes & Sons, Ltd., Kelvin, Bottomley & Baird, Ltd., and Marine Instruments, Ltd.

Employees and Guaranteed Week

Two test cases, affecting about 1,200 employees of Ferranti, Ltd., Hollinwood, have been heard by an insurance appeals tribunal at Oldham. These employees are on short time, which means they are working four days a week under a guaranteed 34-hour agreement. A claim was submitted for unemployment benefit for the two days they were not working. This was rejected by an insurance officer on the ground that being parties to a guaranteed-week agreement they could not be regarded as unemployed whatever hours they might or might not be working. The appeals tribunal decided by a majority against the claimants.

Changes of Name

The Victor X-ray Corporation, Ltd., has changed its name to Newton Victor, Ltd. On 18th May, 1948, the General Electric X-Ray Corpn., of Chicago, held 39,998 shares and Associated Electrical Industries, Ltd., held 159,991 shares, out of 200,000 ordinary shares issued.

Modern Telephones (Overseas), Ltd., has been renamed Modern Telephones (Great Britain), Ltd.

Export Catalogue

Published exclusively for the export market, a new catalogue issued by W. T. Henley's Telegraph Works Co., Ltd., 51-53, Hatton Garden, London, E.C.1, consists of 124 pages printed in various colours and is bound in full cloth. It is intended to give overseas customers a general view of the company's range of products and deals briefly with all its manufactures. Copies are available to exporters in this country and to overseas buyers.

East Midlands Division Headquarters

Nottingham has been selected as the headquarters for the East Midlands Division of the British Electricity Authority. Reconstruction work has already begun on a five-storey building in Barker Gate, Nottingham, which, when completed, will provide a board room, a marble entrance hall and 68 offices, and will present an imposing block of buildings stretching from Ristes Place to St. Mary's Institute.

Readership in Electronics

Recognizing the necessity for industrial organizations to accept some measure of responsibility and assist actively in the problems of the future education of electrical engineers,

Mullard Electronic Products, Ltd., recently offered to finance a Readership in Electronics at the City and Guilds College of Imperial College. Following discussions with Professor Willis Jackson on the subject an approach was made to the Rector of Imperial College, Sir Richard Southwell, outlining the company's views and desires, and this has resulted in the acceptance of the offer by the University of London. The Readership will be mainly concerned with post-graduate teaching of research.

Overseas Inquiries

Besa, Fernandez, Av. B. O'Higgins 866, Santiago, Chile, wish to get in touch with United Kingdom manufacturers of various articles, including electrical equipment and all types of machinery. Some of the goods are at present prohibited from entering Chile, but it is hoped to arrange for their import when conditions improve (Ref. 38537/48).

The Sociedade Comercial Promedico (proprietor, Mr. Harry Zerkowski), of Rua Araujo Porto Alegre, 70-s. 811, Rio de Janeiro, wishes to obtain agencies for United Kingdom manufacturers of electro-medical equipment. (Ref. 36759/48.)

Dissolution of Partnership

J. O. G. Baron, A. Baron and **H. E. Green,** carrying on business as " The Meteor Electric," electrical contractors, at 18, Dover Road, Brighton, Sussex, have dissolved partnership. The business will be carried on by J. O. G. Baron who will attend to debts due to, or owing by, the late firm.

Trade Announcements

From 1st September the address of the London office of **Santon, Ltd.,** will be 18, Lowndes Street, Lowndes Square, S.W.1 (London manager: Mr. A. J. Wyndham Roberts) where considerably greater storage facilities will be available.

Denman Electrical Supplies, Ltd., has moved to 52-54, Newfoundland Street, Bristol, 2 (telephone: 22163).

The address of **David Hodge & Sons** is now 7, Royal Bank Place, Buchanan Street, Glasgow, C.1.

Trade Publications

Metway Electrical Industries, Ltd., King Street, Brighton, 1, Sussex.—Price list of pressed steel adaptable knock-out boxes.

Metalclad, Ltd., Gasworks Road, Neath, Glamorgan.—Leaflet describing electrically driven 18- and 21-in. circular saw benches.

Crompton Parkinson, Ltd., Astor House, Aldwych, London, W.C.2.—Priced catalogue and four leaflets on fluorescent lamps and fittings.

Communication Systems, Ltd., Melbourne House, Aldwych, London, W.C.2.—Folder (No. 1092) on intercommunication systems.

Trade Marks

RECENT applications for the registration of trade marks include the following; any objections must be made within a month from 18th August:—

SOLA. No. 646,045, Class 9. Electric transformers and a.c. rectifiers.—Sola Electric Co., Chicago. Address for service: c/o Stevens, Langner, Parry & Rollinson, 5-9, Quality Court, Chancery Lane, London, W.C.2.

GENACCO. No. 655,789, Class 9. Electric switches (ordinary), electric contacts, terminals, cut-outs and plug couplings. Also No. 655,790, Class 11. Electric lamp fittings and ceiling roses.—General Accessories Co., Ltd., 21, Bruton Street, London, W.1.

WEDA. No. 658,486, Class 9. Electric batteries and sound amplifiers.—Frank Westerman (Wholesale), Ltd., 94, Dale End, Birmingham, 4.

MEPCO. No. 659,496, Class 9. Electrical apparatus included in Class 9 for performing domestic operations.—J. Fabian, trading as Middlesex Electrical Products Co., 11a, Lampton Road, Hounslow, Middlesex.

STALEC. No. 660,347, Class 9. Electrical appliances and fittings, all included in Class 9, but not cables or wire.—Frank Stanton, Ltd., trading also as Stanton & Co., 60, Moor Street, Birmingham, 4.

BYFONE. No. B660,545, Class 9. Telephonic apparatus.—Garwood Patents, Ltd., Burnett Avenue, Scale Lane, Hull.

ALUMAIN. No. 660,927, Class 9. Electric cables containing aluminium.—Johnson & Phillips, Ltd., Victoria Way, Charlton, London, S.E.7.

TEMPOMATIC. No. 662,372, Class 10. Electric elements for electrically heated blankets.—Modern Electrical Industries (Northern), Ltd., Hollingsworth Lane, Knottingley, Yorks.

ELECTRA-SERVE (design). No. B653,079. Also design of Aladdin and lamp, No. 653,080. Class 11. Food warming and cooking apparatus, apparatus for warming infants' feeding bottles, apparatus for sterilizing by means of vapour, and steam-generating installations, all electrically operated.—Electrical Industries, Inc., Newark, N.J. Address for service: c/o Cruikshank & Fairweather, 29, Southampton Buildings, Chancery Lane, London, W.C.2.

SUMMERLITE. No. B658,666, Class 11. Fluorescent electric lamps.—Duralite, Ltd., 25, Manchester Square, London, W.1.

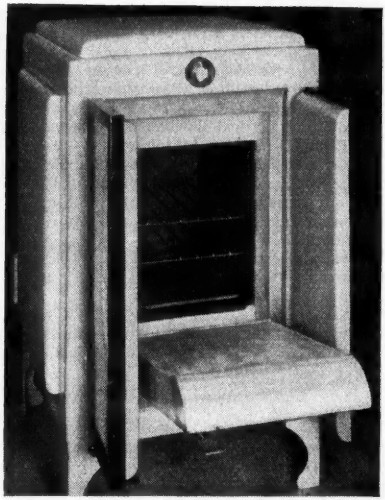
COPRIX. No. 661,604, Class 11. All goods included in Class 11.—Samuel Gratrix, Ltd., Quay Street, Deansgate, Manchester, 3.

BYLOCK (design with word superimposed on map of British Isles in circle; mark to be used only in British Isles, with no exclusive right to map device). No. 662,294. Also girl design with " Bylock " on hat. No. 662,296, Class 11. Electric heating, hair-drying and hand-drying appliances.—Bylock Electric, Ltd., 109, South Street, Ponders End, Middlesex.

Low-Heat Cooking

EXPERIMENT IN NEW TECHNIQUE

TESTS under normal domestic working conditions have recently been made in the Midlands Electricity Area with a view to exploring the possibilities of "heat-soak" cooking. An experimental cooker designed by Mr. A. Barham and assembled at Aston Fields workshops was used, and sufficiently conclusive results were obtained to indicate that successful and versatile cooking is a practical and economical proposition by means of continuous controlled heating at low average temperatures



Cooker used in "heat-soak" test in the Midlands Electricity Area

of about 200 deg F, which is the basic principle of the new cooker.

When testing, it was found advantageous to vary normal cooking technique, but not sufficiently to upset usual household practice. For example, when making porridge the ingredients were placed in an enclosed casserole in the oven the night before, with the thermostat at just under 200 deg, and when taken out the following morning the porridge was served direct on to the table in perfect condition. Stirring during cooking is unnecessary as the lumps which sometimes form in porridge cooked too quickly result from "sealing in" of unsoaked oats.

Although the cooker is primarily intended for use at low heats, higher temperatures can be obtained speedily if required for, say, confectionery baking, by simple adjustment of the thermostat control, and the oven will then operate like any other electric cooker.

The test was made over a period of six months in an average household of five persons, and although switched on night and day, the total consumption was less than 500 kWh. All of the oven cooking and much of the usual hotplate cooking were successfully done by the low-heat method.

The construction is of pressed steel sections welded together, with glass or slag wool lagging up to 6 in. thick and high glaze white enamel finish. The thermostat is a Diamond "H" direct break, single-pole 20-A type with pilot lamp. There are three 600-W plug-in plate elements arranged at the bottom and sides of the box oven which is a standard product. The double doors open by depressing a foot pedal, and the heavily lagged inner door drops at the same time, cushioned by adjustable springs.

Electricity Generation

13 Per Cent Increase in July

BASED on returns from all stations controlled by the British Electricity Authority, the North of Scotland Hydro-Electric Board and the Lochaber Power Co., the amount of electricity generated in July was 3,242 million kWh (including 73 million by water power), the quantity sent out being 3,051 million kWh and the installed capacity of plant (m.c.r.) 13,001 MW. Corresponding figures for July, 1947, were 2,868 million kWh generated (85 million by water power), 2,699 million kWh sent out and 12,490 MW installed capacity. The quantity generated represents an increase of 374 million kWh (13 per cent) over July last year, the installed capacity having risen by 511 MW (4·1 per cent).

For the seven months of the year to the end of July 26,587 million kWh was generated (729 million by water power) and 25,075 million kWh was sent out. Compared with the first seven months of 1947 there was an increase of 2,042 million kWh (8·3 per cent) in the total generated, including an additional 38 million kWh (5·5 per cent increase) by water power.

Coal consumption in July aggregated 1,936,000 tons, an increase of 205,000 tons (11·8 per cent), and in the seven months 15,975,000 tons—1,002,000 tons (6·7 per cent) more than up to the end of July, 1947.

In the week to 13th August the output from solid-fuel fired stations was 691·7 million kWh, compared with 577·6 million kWh in the previous week and 592·5 million kWh in the corresponding week of last year. Stocks of coal at power stations at 14th August amounted to 4,015,700 tons (5·7 winter weeks' supply).

Electrical Training

Securing Competent Electricians

By W. Le PAGE,
A.M.I.E.E.

I LISTENED recently to a discussion on the poor educational standard and general apathy of young lads leaving school to join various branches of the electrical industry. Most of the speakers had the same immediate interest as I have, i.e., the electrical contracting and maintenance side of a large organization and although these notes are written with a particular bias to the contract electrician, I feel that the general theme has a much wider scope.

Neither the discussion, nor some reports I have just read from the principal of the local day continuation school on a number of trainees in whom I am particularly interested, give much pleasure. These reports appeared to bear out statements made during the discussion, that education had been so interrupted during the last ten years and discipline so lax that a poor outlook and ability to concentrate was inevitable among youths for several years to come.

I have also had occasion to interview over a period of weeks some six or seven applicants for employment as electricians. The duties that a successful applicant would be required to carry out are those common to any first-class electrical contracting organization. Most of the men I saw were between twenty-four and thirty, and their training, if they had had any of an electrical nature before the war, had been interrupted by military service. Some, during their spell in uniform, had fulfilled tasks having an electrical background, others had not. On demobilization they had joined various small contractors and generally had been engaged on housing contracts. All claimed to be regarded as electricians.

In seeking to find out whether they had had any experience of motor and conduit work I asked each in turn, among other simpler questions, to imagine a three-phase, 400-V a.c. service termination in one corner of the office, and a 15-h.p., wound rotor, slip-ring motor with stator and rotor starting panel in another corner. The motor had to be wired up with v.r.i. cables in conduit and I wanted to know what switchgear cable and conduit would be required. On no occasion did I get the glimpse of an answer and each time I led backwards with questions on full load currents to be anticipated, size of cables required to carry such currents, conduit cable capacity, method of connecting the starter, etc. The answers indicated that not only did the applicants not know, but some were even completely unfamiliar with cable nomenclature and devoid of ideas on induction motors.

I have also been approached from time to time by organizers of various training schemes for ex-Servicemen. Broadly the trainees appear to be given nine months' intensive instruction on electrical installation work and then vacancies are sought for them with electrical contractors as adult mates with a view to completing their training and being made fully competent to take up tools at the end of a similar period. Perhaps it is rather unfair to infer any relationship between these three categories, but the main point of similarity is that training has been interrupted, expedited, or commenced on a poor grounding.

Something more than advice as to the best course of technical training to follow is necessary with the younger lads, and some stimulus to complete training which has either been too specialized to date to be of sound commercial use, or has been interrupted by the war years, is necessary with the other classes mentioned.

Someone may immediately say that if I feel strongly about those whose training has been expedited I could serve good purpose by recommending the engagement of a limited number of such men with a view to sponsoring them carefully through graded tasks and finishing with a worth-while product. That would be a fair answer if it were fair on the fully trained and experienced man that he always fell in for the more difficult job and was paid much the same as the other for whom jobs had to be selected.

I expressed the view recently to a senior member of the electricity supply industry that the war years had caused us in part to become a nation of machine minders and that many operatives who had been tutored in some few engineering processes wanted

to be regarded as craftsmen in the broadest sense of the term. Further, there appeared to be no hope for an improvement in the standard of workmanship in certain cases until there was a greater premium on skill, experience and training. Each craft should have its own organization for ensuring the standard of output of its members.

I was told that I was more or less advocating the return of the guild system. The history of the guilds shows that there were many faults and abuses but at least they provided part of the foundation upon which the standard of British craftsmanship achieved such high reputation.

During the war years I was responsible in varying degrees for the training of certain classes of Service electricians both in England and in India. It must be recognized that the specialist training which had to be given under conditions then obtaining has been partially responsible for the position reviewed in the opening paragraphs. But ignoring the wartime scope of such training the system under which it operated had much to commend it. Such a statement is in the nature of a confession for one who to his regular Service colleagues was only a civilian in uniform and not over Service-minded.

In this country at least the Service man was graded as unskilled until he had successfully followed a course of instruction designed to fit him for the particular trade he wished to pursue. In most instances, particularly in engineering, each trade was divided into two groups, the degree of responsibility corresponding roughly to that of "mate" and "tradesman" in civilian life. A man started on a course of instruction at a technical training school, designed to instruct him in certain well-defined duties in the lower or mate grade. During the course his progress was watched and unless he displayed the necessary application and intelligence he was removed from training and remained "unskilled."

Trade Test Boards

At the end of the course he was examined by a Trade Test Board, generally located at the school for convenience, but controlled by an independent Central Trade Test Board. The examination was essentially practical and oral. The trainee could not only pass or fail; he could obtain three classifications of pass and his rate of pay from then on was similarly classified. If, having obtained a low-grade pass, the tradesman continued to study and apply himself to his task on his new station, he might apply to his C.O. for reclassification. Arrangements would, in due course, be made either for this examination to be carried out by a touring unit from the Central Trade Test Board or, if more expeditious, for a local Trade Test Board comprised of the appropriate specialist officers and N.C.O's to be convened. If the tradesman was successful, his classification was improved and so was his pay.

After a reasonable period in the lower category to give necessary experience a further course could be taken for remustering to the senior section of the trade. Again the same process applied—three categories of pass and rates of pay. In each group the tradesman had well defined responsibilities and signed for each job executed. If, through any reason, the result of his work was in doubt, the tradesman might be subjected to disciplinary action. There was no chance of promotion to N.C.O. status until the man was a first-class tradesman.

Essentially Practical

So much for the process: what of the detail? The educational standard of many of the trainees was not high and the training was essentially practical. With Indians in particular, who might speak English well but had little knowledge of common idioms, lectures and theory had to be reduced to a minimum. I have quoted one instance of a lecture devoted to the "corkscrew rule" at the conclusion of which, seeing something of the blank faces, I interrupted the instructor and found by questioning the class that not one trainee knew what a corkscrew was. Such difficulties were overcome by essentially practical instruction, by synthetic training devices in the main made up by instructors, and large scale replicas of any piece of apparatus designed to show just how something did work.

I quote instances from India because surely no difficulty of low educational standard at home could present greater problems. Also the caste system brought in restrictions far deeper in root than any trade union categorization of tasks which might be executed by any particular tradesman. On occasions I have walked into a workshop in which Indian trainees were carrying out practical work and taken up a stand at a vacant bench to do some small job purely to give the class the surprise of seeing me clean up tools and bench on completion.

How can these instances be related to our present problems? In putting forward the following I am not endeavouring to cast a concrete scheme but to make suggestions which might be moulded and formulated if there is the interest to do so. With the nationalization of the electricity supply industry, the State must be very primarily interested in the quality of its operative staff, and the much quoted "there will never be an improvement in the standard of production until there is unemployment" is a dismal outlook indeed.

I feel that the answer lies partly in a guild or organization whose ranks are open to apprentice members, trade members and professionally qualified engineers, the last two categories taking an active interest in the training of the younger members. To make this really effective, the executive and skilled operative must be in close touch with not only the training but the day-to-day practical work of the apprentice and partially trained member, and membership must be so valued and prized that any criticism or disciplinary action has real result.

A local panel so visualized would have a real knowledge of the training effort and day-to-day work of its junior members. Whilst it is by no means suggested that the present accepted technical examining boards should be side-tracked, the reports of such panels should be taken into consideration when an apprentice presents himself for examination. Moreover, since there are a large number of really skilled men who have served an apprenticeship or have gained full skill by experience but have no recognized qualification, the local panel would be in a position to act in very much the same way as the local Service Trade Test Board, making recommendations to the central examining bodies for the classification of its members. Finally, all examinations for full trade membership should be practical and oral, with classified results and rates of pay dependent upon such results, with the opportunity of re-examination and re-classification at a later date when justified.

By such means one would ensure that only those who deserved to be classified as electricians were officially so designated and that with such designation an appropriate remuneration was automatic.

Agriculture in Madras

Important Load Development

STIMULATED by the "Grow More Food" campaign, rural electrical development in Madras is setting a heavy task for the Government Electricity Department. According to the latest report of the Chief Engineer for Electricity, Sri G. Sundaram, there were, for example, 12,000 applications on the books for supplies to electric pumping sets for irrigation purposes. A target of 1,800 pump-set connections was aimed at in the Government area but only 1,287 could be completed because of difficulties in obtaining materials.

Scarcity and high cost of draught-cattle, together with the high level of crop prices and the comparative prosperity and freedom from worry of farmers using electricity are given as reasons for the clamour for electricity supplies to meet which it is considered essential that rural extension schemes sanctioned or under investigation which are estimated to cost Rs 3 crores shall be completed next year.

During 1946-47 new agricultural services connected in the Government area numbered 822 and in the licensee areas 401. An additional 101 villages were given a supply making in all 1,104 towns and villages served. In fulfilment of the Government policy of intensive rural reconstruction in selected "firkas" each consisting of from 20 to 25 villages, the Department was required to arrange for the supply of electricity, and proposals have been submitted in respect of a number of these villages; some are far from existing power sources and the resultant deficits are to be met from a special development fund.

Major construction schemes sanctioned during the year included the Machkund hydro-electric project to be developed jointly with the Orissa Government, and the Pykara and Moyar extensions. Progress was also made with extensions at the Madras (Basin Bridge), Papanasam and Vizagapatam stations as well as with a number of important transmission schemes. The work at Madras, where the undertaking was acquired from the company in August, 1947, includes the installation of a 15,000-kW English Electric turbo-alternator and three Babcock & Wilcox boilers, with the addition of two more sets later. A minimum total demand of 125,000 kW in the hydro-electric area is forecast for 1951, and a programme of further extensions has been drawn up.

Aggregate power demands on the Government systems rose from 60,870 to 71,683 kW at 31st March, 1947, but because of strikes consumption decreased and the total amount generated dropped from 327 million to 318 million kWh. In the province as a whole 409 million kWh was generated. Consumers at the end of the period numbered 160,871.

Lighting Fittings

Census of Production Statistics

REPORT No. 13 of the Partial Census of Production for 1946 deals with the electric lighting accessories and fittings industry and covers the activities of firms engaged wholly or mainly in the manufacture of such equipment and electric bell apparatus.

Figures published in the *Board of Trade Journal* put the value of production (gross output) in 1946 at £8,352,000 compared with £3,687,000 in 1937. The value of sales of lighting accessories and fittings, excluding bulbs and glassware, in 1946 was £7,360,000 compared with £4,034,000 production for sale in 1937; exports f.o.b. amounted to £1,546,000 (£538,000) and retained imports c.i.f. £14,000 (£373,000). The sales value of electric bell apparatus (not telegraphic or telephonic) was £212,000 (£128,000 production in 1937), exports totalling £130,000 (£15,000) and retained imports nil (£29,000).

Other products of the same manufacturers had a value (sales) of £1,645,000 in 1946 against £710,000 production in 1937. They included switchgear and fusegear, starting and controlling gear for motors, radio, telecommunication and electronic apparatus, cooking and heating appliances, transformers and meters.

Materials, fuel and electricity used cost £3,231,000 (against £1,685,000), the quantity of electricity purchased being 10·6 million kWh (5·6 million). The average number of employees was 12,257 (9,673 in 1937) of whom 6,724 (4,433) were women. The total amount paid in salaries and wages in 1946 was £2,752,000.

Building Regulations

Impact upon Electrical Contractors

ON 1st October the new Building (Safety, Health and Welfare) Regulations, 1948 (H.M. Stationery Office, 10d.), become effective. A number of the Regulations affect electrical contractors and the extent of these obligations is set out in a letter sent to members of the Electrical Contractors' Association by the director, Mr. L. C. Penwill.

The Regulations apply to a number of operations and the persons employed in them, including construction, alteration, repair and maintenance and demolition of buildings, the preparation for building and to machinery and plant employed in these operations. Plant and electric lines are not considered to be "buildings" in themselves.

Primarily each employer is bound to ensure the observance of such of the Regulations as affect his own employees but some operations are of such a nature that only the employer undertaking them can ensure that the Regulations are observed, whether his own or another employer's operatives are affected.

The obligation is imposed by Regulation No. 98 upon employers who normally employ more than fifty persons to appoint a "safety officer." It is pointed out that the figure relates to the total number of employees, not to the number of employees at any one time in any one site.

Responsibility for scaffolding is defined and other regulations cover the safety of operatives working near openings in floors and walls and on or under sloping roofs. Other requirements relate to the provision of first-aid boxes on sites where more than ten persons are employed and to the recording of the safe working loads of ropes, etc.

B.E.A. Contracts

Plant for New Stations

DURING the past two weeks contracts for generating station, switching and transforming station and transmission equipment amounting in the aggregate to £1,874,884, have been placed by the British Electricity Authority. They include boiler feed pumps, Barking "C" generating station (Mather & Platt, Ltd.); civil engineering works, Poole generating station (Sir Robert McAlpine & Sons (London), Ltd.); fuel handling and conveying plant, Carrington generating station (W. J. Jenkins & Co., Ltd.); site excavation, Carrington generating station (Taylor Woodrow Const. Co., Ltd.); coal and ash handling plant foundations, Agecroft generating station (J. Gerrard & Sons, Ltd.); 22-kV cables, London Division (British Insulated Callender's Cables, Ltd.); 60-MVA, 132/66/11-kV transformers and shunt reactors, Islington substation (British Thomson-Houston Co., Ltd.); 33-kV cable, Kingston (Siemens Bros. & Co., Ltd.); 33-kV, 1,500-MVA switchgear, Accrington (A. Reyrolle & Co., Ltd.); 30-MVA, 132/33-kV transformers, Redhouse substation (Bruce Peebles & Co., Ltd); and 30-MVA, 132/33-kV transformers, Clyde's Mill substation (Bruce Peebles & Co., Ltd.).

New Zealand Imports

ELECTRICAL imports into New Zealand, which recently raised its pound to parity with sterling, made a big recovery last year. They nearly doubled in value. The Dominion Government has not yet caught up arrears in the publication of detailed statistics, by countries, of the country's external trade. The accompanying table, however, shows the comparative values in 1946 and 1947 of the main groups.

Class	1946 £(000)	1947 £(000)
Storage batteries	9	33
Lamp bulbs	53	80
Radio sets	1	13
Radio valves	57	142
Other radio apparatus	180	326
Other electrical machinery and equipment	3,451	6,647

Post-Hole Borer

ASSISTING THE ERECTION OF OVERHEAD LINES

DURING the war a number of self-contained machines for boring post holes in the ground were shipped to England by the Canadian Army. They were of a type used extensively by electricity organizations in the United States where the employment of robust mechanical tools is essential.

One of these machines has been adapted to suit conditions in this country, for use in the area of the Midlands Electricity Board to assist in the construction of overhead power lines. It is anticipated by Mr. H. J. Gibson (chief commercial officer, M.E.B.) that the outfit will prove to be very valuable in offsetting labour difficulties which have already arisen in connection with the heavy programme of rural electricity supply extension work.

The outfit consists of a vehicle with a six-cylinder 50-h.p. petrol engine driving all four road wheels. It is equipped with a winch and auger which are driven through coupling gears by the main engine.

The winch has two forward and one reverse speeds and is fitted with an overhead limiting device. It is mounted immediately behind the driving cab. The auger equipment, which includes a lattice mast enclosing the power feed drive, is pivoted at the reinforced end of the vehicle and the complete unit can be set at any desired angle fore and aft for drilling and lowered to a safe position for road travelling.

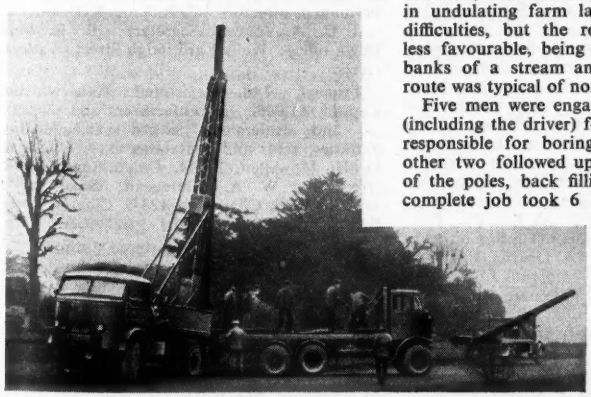
The lattice mast has a sheave at the head and a jockey pulley so that poles may be hoisted by the winch and dropped into the bore. The auger has five forward and one reverse speeds, enabling speed to be varied to suit the ground being drilled, thus preventing undue strain.

Auger end of boring machine
(*Evesham Journal* photo)

In normal soil an 18-in diameter bore is drilled at the rate of 2 ft per minute.

As an indication of the capabilities of the machine the following particulars refer to the construction in the Midlands of a light 11-kV overhead line to BS Specification 1320. Twenty-three poles, average length 26 ft and 10 in. butt diameter, were erected. Seventeen were placed in undulating farm land which presented no difficulties, but the remaining six sites were less favourable, being on uneven ground, the banks of a stream and in a hedgerow. The route was typical of normal rural distribution.

Five men were engaged on the work; three (including the driver) formed the machine crew responsible for boring and erecting and the other two followed up for the final alignment of the poles, back filling and ramming. The complete job took 6 hours 8 minutes, or an average time of 16 minutes for manœuvring the vehicle, boring the hole and erecting each pole. At a conservative estimate normal manual excavation and erection under similar ground conditions would have taken the same number of men at least two and a half working days.



Borer-erector truck and Leyland lorry with monkey winch arranged for final extraction of 40 ft pole with foundation block

FINANCIAL SECTION

Company News
Stock Exchange Activities

Reports and Dividends

The Anglo-Portuguese Telephone Co., Ltd., reports a revenue for 1947 of £752,948, as compared with £676,926 for the preceding year. From this is deducted operating expenses and directors' remuneration, leaving a balance of £98,043, to which is added interest and fees of £5,727. After providing for debenture and loan interest and debenture sinking funds it is proposed to pay a final ordinary dividend of 5 per cent, making 8 per cent for the year (same), and to again pay a dividend of 8 per cent on the " A " ordinary. The balance carried forward is £42,732 (against £42,092 brought in).

The London Electrical & General Trust, Ltd., reports a revenue for the year ended 30th June last, after providing for expenses, debenture interest and income tax, of £25,919, as compared with £23,744 for the preceding year. It is proposed to pay a final dividend of 4 per cent, maintaining the distribution for the year at 6 per cent.

The London Electric Supply Corporation, Ltd., has announced a final payment of 1¼ per cent for the three months ended 31st March last. For 1947 the ordinary dividend was 6 per cent.

Ruston & Hornsby, Ltd., announce that the recent issue of 410,000 ordinary £1 shares at 50s. a share to ordinary stockholders has been oversubscribed.

Electricity Securities

The British Electricity Authority announces that the conversion date of the following securities has been declared to be 25th August, at which date the holders became instead the holders of British Electricity 3 per cent guaranteed stock, 1968-73, issued at par and redeemable at par. A first payment of six months' interest on this stock will be made on 1st October, 1948. Unless otherwise stated the securities are ordinary shares, the value given being new stock equivalent per £1 nominal of old security:—Askrigg & Reeth E.S. Co., Ltd., £1 18s. 6d.; Dunoon & District E.S. Co., Ltd., £1 12s. 6d.; Herne Bay & District E.S. Co., Ltd., £1 15s.; North West Midlands J.E.A. 3 per cent stock, £104 per £100 nominal; Ringmer & District Electricity Co., Ltd., £1; Stornoway E.S. Co., Ltd., £1 12s. 6d.; and Westmorland & District E.S. Co., Ltd., £1 8s. 9d.

Increases of Capital

Christy Brothers (Chelmsford), Ltd.—Capital increased by £100,000, in 50,000 ordinary and 50,000 5 per cent cumulative irredeemable preference shares of £1 each, beyond the registered capital of £100,000.

Fielden (Electronics), Ltd.—Capital increased by £13,000, in £1 ordinary shares, beyond the registered capital of £2,000.

Selectrics, Ltd.—Capital increased by £10,000, in £1 4 per cent cumulative preference shares, beyond the registered capital of £1,000.

Denco (Clacton), Ltd.—Capital increased by £10,000, in 5,000 1st redeemable preference shares of £1 and 8,000 2nd redeemable preference and 12,000 ordinary shares of 5s. each, beyond the registered capital of £10,000.

Wire-Less Motors, Ltd.—Capital increased by £900, in 1s. ordinary shares, beyond the registered capital of £100.

New Companies

Lloyds Engineering Companies, Ltd.—Registered 12th August. Capital, £30,000. Mechanical, electrical, water and gas power engineers, manufacturers of, and dealers in, electricity and electrical goods and equipment, engineering, development and research specialists, etc. Directors: F. L. Kessel (director of Cleanette Appliances, Ltd.) and A. G. A. Rainey (director of G.P.U., Ltd. and various other companies). Secretary: A. G. A. Rainey. Regd. office: 6, Southampton Place, W.C.1.

Watford Refrigeration & Electrical Repairs, Ltd.—Registered 16th August. Capital, £300. Refrigeration engineers and consultants, including the manufacture, installation, maintenance, servicing, sale, hire, etc., of equipment. Permanent directors: E. R. Vine, S. J. Hazelton and C. A. Jones. Secretary: E. R. Vine. Regd. office: Wells Yard, High Street, Watford, Herts.

Tynebat, Ltd.—Registered 16th August. Capital, £1,000. Manufacturers and repairers of, and dealers in, electric accumulators, batteries, acids and containers, etc. Directors: D. H. M. Allen, P. M. Colvin-Smith, F. A. Orrell and W. A. Whitehead. Regd. office: Martins Bank Chambers, 123/5, Clayton Street, Newcastle-on-Tyne, 1.

W. J. Lacy, Ltd.—Registered 14th August. Capital, £6,000. To acquire the business of radio and electrical engineer carried on by W. J. Lacy at 64, Homend, Ledbury, Herefordshire. Directors: W. J. Lacy and F. E. Peters. Secretary: Doris M. Lacy. Regd. office: 64, Homend, Ledbury, Herefordshire.

Frozen Foods Equipment, Ltd.—Registered 11th August. Capital, £1,000. Manufacturers of, and dealers in, refrigerating plant, food cabinets and containers, electrical and gas equipment, etc. Directors: E. W. Turner and R. Hardman. Secretary: Ernest W. Turner. Regd. office: 36, Stanley Street, Southport.

Britran (Birmingham), Ltd.—Registered 17th August. Capital, £5,000. Manufacturers, factors, installers and maintainers of, agents for and dealers in, transformers and other apparatus, etc. Permanent directors: A. E. Pennington and Olive L. Pennington. Secretary: A. E. Pennington. Regd. office: 25/9b, Newton Street, Birmingham, 4.

J. Hanson (Refrigeration), Ltd.—Registered 13th August. Capital, £1,000. To acquire the business of a refrigeration engineer and dealer in refrigeration supplies carried on by John Hanson at 17, Brampton Road, Hampden Park, Eastbourne, and to carry on the business of manufacturers of, and dealers in, refrigerators and refrigeration supplies, etc. Directors: H. Hatley, Miss Emily A. Hayler, J. Hanson, Mrs. Grace Hanson, Rev. D. J. McGregor and A. Drew. Secretary: D. R. Duncan. Regd. office: 17, Brampton Road, Hampden Park, Eastbourne.

Liquidations

The W.P. Electrical Co., Ltd.—Members' voluntary winding-up. Liquidator, Mr. C. E. Strutt, 19, Market Street, Bradford, Yorks, appointed 9th August, 1948.

J. Smith & Co. (S.S. Batteries), Ltd.—Meeting 17th September at Shell Buildings, Blackheath, Birmingham, to hear an account of the winding-up by the liquidator, Mr. E. R. Marsh.

Bankruptcies

W. J. Griffin, carrying on business at 2, Hinckley Road, Earl Shilton, Leics, radio and electrical dealer.—Trustee, Mr. E. E. V. Rowley, 7, St. Martin's East, Leicester, appointed 17th August, 1948.

H. W. Laker, residing and carrying on business at 3, The Parade, Station Road, New Milton, Hants, as "New Milton Electrical Engineers," and previously residing and carrying on business at "Beulah," Manor Road, New Milton, as "H. W. Laker & Co.," electrical engineer and contractor.—Trustee, Mr. K. R. Cork, 19, Eastcheap, London, E.C.3, appointed 18th August, 1948.

Receiving Order Rescinded

A. Hitchcock, radio and electrical engineer, lately carrying on business at Bell House, Delph, near Oldham, as "Kolvec Radio Service."—Receiving order dated 8th December, 1947, rescinded, debts having been paid in full.

Companies to be Struck Off Register

The following companies will be struck off the register after three months from the dates given unless cause is shown to the contrary:—11th August—District Transmission Lines, Ltd.; Zenith Auto Electrical Services, Ltd. 20th August—Birmingham Electrical Accessories Co., Ltd.; Tyrela Electric, Ltd.

Dutch Electrical Trade

Rapid Recovery

IN Holland's economic dilemma, which is not unlike Britain's, she can look with confidence to her electrical manufacturing industry to earn substantial sums in foreign exchange. Last year the ratio between Holland's exports and imports of electrical goods was, with minor exceptions, much the same as before the war, being valued at about Fl. 150 million and Fl. 100 million respectively. Radio and lamp exports were over Fl. 115 million in value.

The principal suppliers of generators and motors to Holland were Switzerland, the United Kingdom, the United States and Belgium. In furnishing l.v. apparatus Belgium and Sweden predominated, and from the latter came also a large proportion of the vacuum cleaners. Meters were derived mainly from Switzerland, wires and cables from Belgium. In unspecified h.v. apparatus Belgium, France, Switzerland, the United States, and the United Kingdom all competed. No important details of the destinations of Holland's electrical exports in 1947 have yet been revealed. The values of the chief groups of both imports and exports are shown in the accompanying table.

Class	Imports Fl. (000)	Exports Fl. (000)
Generators & parts (excluding dynamos for cycle lamps)	4,415	1,001
Motors up to 5 kg	104	408
Motors over 5 kg	5,874	1,500
Radio parts	29,676	83,721
Other l.v. apparatus	15,471	1,189
Vacuum cleaners	1,437	5,496
Electricity meters	2,233	—
Cookers and parts	797	—
H.v. apparatus n.e.i.	27,166	11,613
Wires and cables	3,353	9,110
Metal filament lamps, over 16 V.	77	19,924
Metal filament lamps, not over 16 V.	26	5,171
Other lamps, including sodium, etc., tubes	19	7,939

Philips of Eindhoven are credited with providing 13 per cent of the country's total industrial exports, and the degree to which they have managed to resume their progress is remarkable in view of the damage they suffered. During the occupation a quarter of their floor space was rendered unusable and the entire stock of materials and much valuable equipment were removed by the Germans. Output at the end of 1947 was about 50 per cent above pre-war level.

Philips long ago adopted the policy of branch manufacture abroad, influenced by the tendency towards self-sufficiency that had been growing in every country. They supplied the expert advice on planning factories, together with the machinery and a certain amount of semi-finished material, and the staff for training the workpeople. Ultimately all but the higher posts were filled by local people.

STOCKS and SHARES

STOCK Exchange markets are quieter now than they have been for probably twenty or twenty-five years, with the exception of certain periods during the war when business became more or less paralysed by current events. For to-day's quietude the foreign political position is in the main responsible. It is to some extent anomalous that the greater the obscurity of the outlook, the more persistent is the buying of British Government and kindred securities, with the natural effect of advancing their prices. British Electricity Stock, for example, is 100¼, ex the half-yearly interest due on 1st October, and Transport Threes are in demand at 98¼.

E.M.I. Prospects

Electrical & Musical Industries' financial year ended on 30th June. Although the results are not expected for another two months or so from now, stockholders were given a pre-view of the situation in the circular which accompanied last month's particulars of the £2 million issue of 4 per cent notes. On the estimate of a slight rise in group trading profits, net earnings, after tax, are estimated at not less than £250,000, or £133,000 more than those for 1946/47, which barely met the reduced ordinary distribution of 6 per cent. Now 18s., "Emmies" 10s. shares are 3s. 9d. below this year's best, but have withstood better than most the evidence of difficult business in the radio and allied trades. They still yield no more than 3¼ per cent, on the last dividend. Radio exports from all manufacturers were stated last week to be running above the target of £1 million a month. E. K. Cole at 14s. are 1s. up, and Cossors at 9s. 6d. are also better on the week.

Week's Changes

Victoria Falls & Transvaal Power ordinary at 7¼ are 3s. 9d. higher in anticipation of the repayment price, of which details are not yet available. Rises of ⅞ lifted Lancashire Dynamo to £5 and Tube Investments to 6¼. Great Northern Telegraphs are 10s. better at 22¼. Cable & Wireless stocks at 124½ for the preference and 194 for the deferred, are a steady market. Amongst the few falls, British Electric Traction deferred at 1,600 shows a loss of 25 points. Metal Industries "B" at 43s. 3d. are ⅞ lower, and Anglo-American Telegraph preferred at 119½ is 10s. down. Babcock & Wilcox at 66s. 6d. have risen 9d.

Electricity Supply Dividends

The announcement by the London Electric Supply Corporation of a dividend of 1½ per cent for the quarter to 31st March, 1948, is the precursor of similar announcements from other electricity supply companies whose year ended on 31st December last. It will be remembered that British Electricity Stock came to market on 1st April this year, but there was a three months' hiatus, between the end of 1947 and 1st April, 1948, in respect of which dividends were allowed to be paid by the companies concerned.

Leap Year Considerations

Why there should have been delay in distributing this, is explained by the British Electricity Authority by reference to the amount of detail work involved by the take-over. Moreover, there has been a difference of opinion as to whether the fact that 1948 is a leap year affects the amount to be paid to stockholders. The latter have exercised considerable (and commendable) patience in not pressing for this final settlement of the companies' existence as separate entities, and the money should be distributed within the course of the next few weeks. Edmundsons Corporation is an exception, because the company's year ends with March.

Hackbridge and Hewittic

Hackbridge & Hewittic's latest accounts, published a fortnight ago, showed a 37 per cent increase in the group's net profit, despite a doubling of the taxation provisions. The figure of £53,000 is about seven times the cost of the preference dividend, after which the earnings cover for the 12 per cent ordinary dividend works out at 20¼ per cent gross on the existing capital. According to the chairman's review accompanying the last report, profits for the present year are likely to be at least maintained.

The company's annual meeting on 7th September is to be followed by an extra-ordinary meeting to consider the proposed issue of 200,000 new 5s. ordinary shares. At present, public interest is confined to the £350,000 4 per cent £1 preference shares, which were marketed a year ago, and are now quoted at 20s. Issued ordinary capital is £400,000 and this would be raised by £50,000 as a result of the proposed issue of 5s. shares, for which a price of between 9s. and 10s. is suggested. On the 12 per cent dividend paid for the year ended last March, the shares would be on a yield basis of about 6 per cent.

Effect of Limitation

Investment in these troublous times claims, fairly enough, that 5 per cent is not an unreasonable rate to expect from ordinary shares in the industrial groups. The limitation of dividend policy implies that ordinary shares in sound companies which have signified their intention to comply with the Government's expressed wish have become, at least in practice, much the same as preference shares for the time being. Consequently, the investor is willing to admit that these good class ordinary shares are almost as safe an investment as the preferences, and the anomaly is presented that, in days of profound uncertainty and nervousness, ordinary shares of the best type seldom offer more than 4 to 4½ per cent on the money spent.

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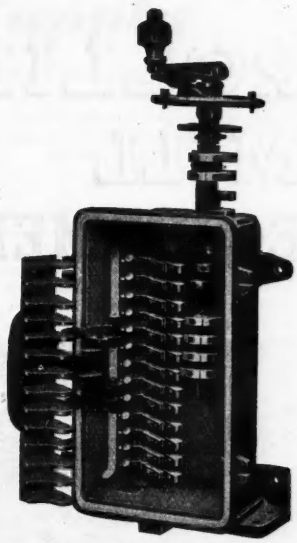

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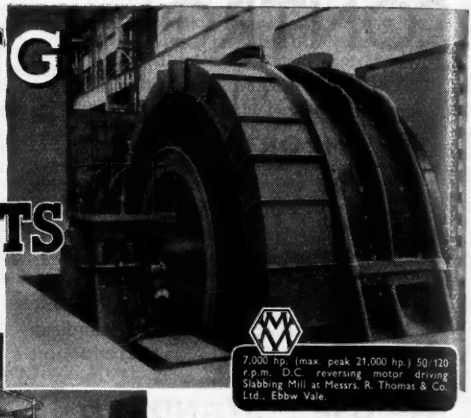
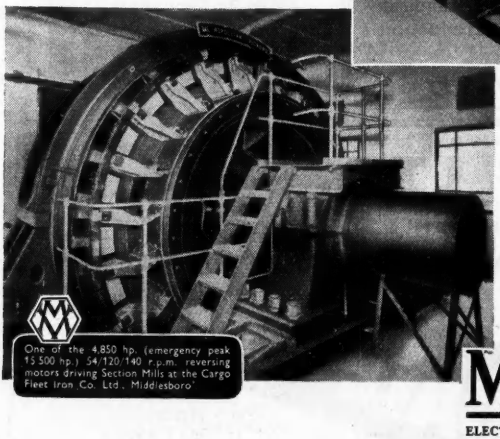


7,000 hp. (max. peak 21,000 hp.) 50/120 r.p.m. D.C. reversing motor driving Slabbing Mill at Messrs. R. Thomas & Co. Ltd., Ebbw Vale.



One of the 4,850 hp. (emergency peak 15,500 hp.) 54/120/140 r.p.m. reversing motors driving Section Mills at the Cargo Fleet Iron Co. Ltd., Middlesboro'

The M-V Company manufacture complete electrical equipments for rolling mills of any capacity.

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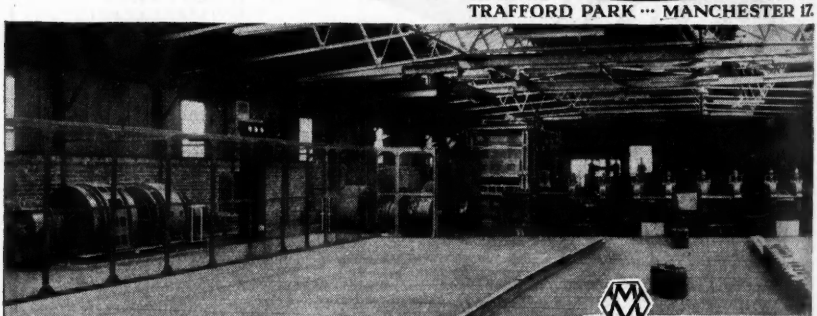

500 hp. 475/950 r.p.m. (max. peak 1,000 hp.) D.C. motor driving Rolling Mill at Messrs. British Driver-Harris Ltd., Cheadle Heath, with the m.g. set and D.C. panel on left.

C/S 801

Switch to METROVICK Lighting when daylight fades

Electricity Supply

Stockton Deficit. French Power Position.

Coatbridge (Lanarkshire).—STREET LIGHTING CONVERSION.—The Council is borrowing £43,000 for the conversion of street lighting from gas to electricity.

Isle of Ely.—SCHOOL LIGHTING.—The County Council Education Committee has approved schemes for the installation of electric lighting at the Elm Road County Primary School, Wisbech (£481) and at the Victoria Road Annexe, Wisbech (£210).

London.—CREMATORIUM EXTENSION.—The City of London Corporation is entering into an agreement with the London Electricity Board for providing an electricity supply, including feeder cables, switchgear, etc., at an estimated cost of £3,600 in connection with the extension of the City of London Crematorium.

South Wales.—TARIFF CHANGES.—In accordance with the statement by the British Electricity Authority last week, the South Wales Electricity Board announces that all running or "unit" charges of less than 0·75d. in any two-part or multiple or block or flat rate tariff which does not contain a provision for variation in accordance with the cost of fuel will be increased to 0·75d. per kWh from and including the December quarter. Further, where any two-part tariff within the area contains provision for a meter rental to be charged, the rental is to be discontinued.

Stockton-on-Tees.—UNDERTAKING'S DEFICIT.—The report of the electricity undertaking for the year ended 31st March shows a total income of £200,731 and working expenses £202,958, leaving a gross loss of £2,227. Loan charges, etc., increased the loss to £19,049. After deducting £6,114 brought forward there was a deficit of £12,935.

Overseas

Australia.—HIGHER CHARGES IN VICTORIA.—Because of increased working costs the Victorian State Electricity Commission has introduced revised tariffs as from 1st July—the first increases since the Commission was established twenty-nine years ago. The charges are mainly on the block rate system and the increases for the most part range between 10 and 14 per cent. Over all they will, it is estimated, yield an extra £750,000 in the next financial year.

France. — POWER POSITION. — A delegation of the National Committee for Electric Power Equipment was recently received by the Minister of Finance, M. Paul Reynaud. The delegation was led by M. Caquot, a well-known engineer and member of the Academy of Sciences who has specialized in the subject of electric power equipment and particularly in hydro-electric equipment. In his opinion, French progress depends mainly on increasing the country's power supplies. At the moment, industry has only 60 per cent of the power needed to operate at a maximum.

M. Caquot states that this year France will produce 30 milliard kWh, of which 13 milliards will be from thermal power stations and the remainder supplied by hydro-electric plants. Resources are estimated at 140 milliard kWh of which 123 milliard is as yet undeveloped. Although the Monnet Plan envisages new barrages which will increase production to 40 milliard kWh in 1951, the work is being retarded by financial difficulties.

In his discussions with the Finance Minister, M. Caquot underlined the gravity of the situation and the extension of unemployment within two years unless the power problem is resolved.

Poland.—JOINT POWER STATION.—Final plans have been approved by the Czechoslovak-Polish Economic Council for a 150,000-kW power station to be erected near Oswiecim, which is to supply the industry of both countries. Czechoslovakia will provide the machinery for the station, including turbo-generators and transformers. The power station is to be completed in 1953. The agreement stipulates that power will be supplied to Czechoslovakia for twenty years.

TRANSPORT

Middlesbrough. — INCREASED TROLLEY-BUS RECEIPTS.—The Tees-side Railless Traction Board had a total revenue of £80,670 in the past year, an increase of £5,273. After making provision for excess profits tax, etc., there is £11,250 to be divided between the constituent authorities, Eston receiving two-thirds and Middlesbrough one-third.

Newcastle-on-Tyne. — TRAMWAY ABANDONMENT.—The City Council is to replace trams by motor buses on the West Moor-Forest Hall route and trolley-buses on the Jesmond-Benton circular route. Seventy-seater trolley-buses, built by Northern Coachbuilders Ltd., will be used on the Jesmond-Benton route.

Pakistan.—RAILWAY ELECTRIFICATION.—The Pakistan Government is exploring the possibilities of electrifying railways in the Dominion and in Lahore as part of a big project for the development of hydro-electric power in the North-West Frontier Province and West Punjab.

RADIO and TELEPHONY

Russia.—TELEVISION SERVICE.—The Leningrad Television Centre has resumed transmission after an eight-year break.—*Reuter.*

NEW BOOKS

Electrical Circuits and Machines. Luminescence of Solids.

Technical Optics. By L. C. Martin, D.SC., A.R.C.S., D.I.C. Pp. 343; figs. 210; index. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C.2. Price 40s.

The title may conjure up in some minds a perhaps not very attractive picture of optical diagrams with geometric and algebraic discussions. Actually, however, only about one-third of Prof. Martin's book deals with image-formation and image-defects due to aberrations and diffraction and they are treated in a manner which makes for reasonably easy reading. The later chapters deal with the eye and vision, physical optics (devoted largely to polarized light), properties of radiation and matter, optical glass (and colour screens) and the making and testing of optical systems, with a concluding chapter on spectacles and their use for correcting defects of vision.

Although the book may have been written primarily for students who are being trained as designers of optical systems, it contains in clear, concise form much that will be of interest and value to all who are concerned with the application of optics in the most general sense, in their scientific and technical work. The author is to be complimented on his selection of material and on the way it is presented, and the publishers on a well-produced volume.—H.M.

Circuits and Machines in Electrical Engineering. By John O. Kraehenbuehi and Max A. Faucett. Vol. I (pp. 367) and Vol. II (pp. 370) both illustrated with separate indexes. Chapman & Hall, Ltd., 38, Essex Street, Strand, London, W.C.2. Price 25s. 6d. each volume.

In the first volume the American authors treat of the electrical circuit very extensively both for direct and alternating currents. In the second volume the circuit is used as a basis for the explanation of the machine. The whole is well done and well illustrated, but it is doubtful whether this method of dividing the subject is wise or advisable for teaching purposes. It would mean that a student would not meet the d.c. motor or generator, even in an elementary form, until he had done some quite advanced mathematics on polyphase currents. Of course the two volumes might be read together, but one does not gather the impression that this is the intention of the authors.

The first volume starts with a semi-philosophical explanation of the subject which is excellent and distinguishes it from most technical textbooks. A short description is given of the role played by such things as definition, experimental data and mathematics and a note on what can be understood by a "natural law." We are entirely in agreement with the authors that such attempts to explain electricity by analogies with hydraulics are dangerous and should be avoided. The m.k.s. system of units is preferred, as it is by most professors of the subject, but the authors admit the c.g.s. system in deference to usual practice.

By the way, is not the statement "Nature always balances accounts to satisfy the Law of the Conservation of Energy" a bit too sweeping in this atomic age ?—W.C.-A.

Some Aspects of the Luminescence of Solids. By F. A. Kröger. Pp. xii + 310; figs. 74; index. Cleaver-Hume Press, Ltd., 42a, South Audley Street, London, W.1. Price 30s.

This book deals with the photoluminescence and to a lesser extent with cathodoluminescence of inorganic solids, but it should be emphasized that none of the technical applications or uses of these phenomena is considered.

The first chapter shows how energy schemes in crystals apply to luminescence in solids. A considerable amount of previously unpublished work is introduced in the next four chapters, which deal with manganese activation, tungstates and molybdates, and activation by uranium and titanium. The last chapter discusses temperature effects and modern theories. Experimental techniques are briefly described in the appendix, which also contains a very complete classification of luminescent solids.

The difficulty of exactly reproducing a luminescent material is only too familiar; consequently results obtained by different workers are frequently at variance. It is therefore possible that much of the original work described by Kröger may not receive general acceptance.

The referencing throughout is very comprehensive, but the introduction of the place name "Pinner" (Middlesex, England) as an author (p. 151) is unfortunate. The author uses the term "luminophor" instead of "phosphor" to describe a luminescent solid and there are a number of spelling and grammatical errors throughout the book. Nevertheless, it contains much of interest for the reader who is already familiar with the more fundamental properties of phosphors, and the classification in the appendix should prove useful.—P. W. R.

Books Received

Elementary Vectors for Electrical Engineers (3rd Edition). By G. W. Stubbings, B.SC., F.INST.P., A.M.I.E.E. Pp. 112; figs. 73; index. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C.2. Price 7s. 6d.

Electricity in South Africa

From Our Capetown Correspondent

Supervision of Supply.—The business of electric power supply in the Union is governed by the Electricity Act, No. 42 of 1922. While this Act provides for a general supervision of the business by the Government, it is by no means synonymous with nationalization in the sense by which the word might be interpreted by the present British Government. The Act set up two bodies, the Electricity Control Board and the Electricity Supply Commission. The first of these stands very close to the Government. It grants licences to power undertakings, approves tariffs, areas of supply, etc., while the Commission undertakes the building of power stations and the supply of power.

The Southern Rhodesian Electricity Supply Act of 1936, which created an Electricity Supply Commission in that Colony, also requires existing undertakings to take out licences, in terms of the Act, for stipulated areas. In the case of Bulawayo the area comprised a circle of radius ten miles from the power station and an obligation was placed upon the Council of giving supplies within that area. So far as these areas are concerned all the supplies are carried out by means of overhead 11-kV lines and, after a considerable amount of trial and error, a standardized form of line construction has been evolved. High-voltage lines average in cost about £400 per mile, using wood poles at about £1 each. Heavy tubular steel piles are used at straining points and for pole-mounted transformer installations.

Supply Commission's Loan.—The new £15,000,000 Electricity Supply Commission loan at 3½ per cent offered in June was soon oversubscribed. The slightly higher rate was a welcome change from the 3 per cent which has so long been the maximum for such issues. The prospectus stated that the purpose of the new issue of stock was the purchase of the Victoria Falls & Transvaal Power Co., Ltd., incidental expenses in the acquisition, and further expenditure on this undertaking.

Water-Power Development.—It is reported that the Union Government is to study the possibility of harnessing the Aughrabies Falls to produce hydro-electric power. The Buchuberg-Upington-Kakamas area would be the main section to benefit. Hopes are based upon the Government's favouring the decentralization of industry, and the Upington and District Chamber of Commerce is expected to press for the development. Upington's town engineer says that in order to meet the demands of potential industrialization, the existing power station is to be doubled. Heavy cables are being slung across the Orange River to supply the southern bank with power and light. Regarding the possibility of using the Aughrabies Falls to generate electricity, he said that while the falls are among the highest in the world, it may be difficult to make use of them because the flow of the river is irregular. At one point the Orange River could be spanned by a 10 ft plank during the dry season, but after heavy rains it might rise up to 25 ft in a few hours. In spite of the high price of coal, which travels nearly 800 miles, it would be cheaper to develop Upington power station.

Power Output.—There were 436 private companies or local authorities which generated a total of 8,557 million kWh in South Africa during 1945-46, according to figures which will be published in the annual report of the Electricity Control Board. These statistics have been compiled by the South African Department of Census and Statistics. The two major authorities were the Electricity Supply Commission and the Victoria Falls and Transvaal Power Co., Ltd. Actual consumption during the year was 7,338 million kWh.

O.F.S. Scheme.—A plan for the electrification of the eastern Orange Free State at a cost of £600,000 has been accepted in principal by representatives of various organizations and farmers' associations, senior public officials and Members of Parliament. It is proposed to electrify the industrial and farming area of Ladybrand, Marquard, Clocolan, Ficksburg, Senekal, Rosendal and Paul Roux. The power plant is to be erected at Ficksburg. A representative of the Department of Commerce and Industries explained that the amended Electricity Act of 1947 makes provision for Government support for such schemes. Mr. Milton, chief industrial engineer of the Electricity Supply Commission, promised the full support of the Commission in working out the scheme.

English Electric Factory.—The English Electric Co., Ltd., has established a factory in Benoni with a floor area of 36,000 sq ft capable of expansion to 350,000 sq ft. The new works is designed on lines which will ensure not only efficiency of technical arrangements but economy of operation—even to the extent of having rail siding access into the shops. All the equipment is of the latest type and most of it has been imported from Great Britain. An impressive range of electrical goods is planned for this factory, including industrial type motors of 1 to 80 h.p., distribution transformers from 5 to 300 kVA and up to 11,000 V, welding transformers, switchgear cubicles and trucks, distribution boards and busbar equipment. The reconditioning of pumpless steel tank rectifiers and calibration of house service meters will be undertaken.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1943

BRITISH THOMSON-HOUSTON Co., Ltd., and A. C. Lane.—"Dynamo-electric machines." 758. 15th January, 1943. (606100.)

British Thomson-Houston Co., Ltd.—"Temperature compensation for direct-current telemeters." 19165. 21st November, 1942. (606103.)

Gibson Electric Refrigerator Corporation.—"Capillary tube expansion control in refrigerating systems." 20231. 17th October, 1940. (605860.)

1944

Telefonaktiebolaget L. M. Ericsson.—"A.C. relays." 2746. 5th January, 1943. (605935.)

British Thomson-Houston Co., Ltd.—"Electric control systems." 4895. 20th March, 1943. (605937.)

British Thomson-Houston Co., Ltd.—"Apparatus for and methods of coupling ultra-high-frequency systems." 7626. 27th April, 1943. (606105.)

A. A. Thornton (Magnavox Co.).—"Electrolytic capacitors." 12409. 29th June, 1944. (606108.)

Sperry Gyroscope Co., Inc.—"High-frequency electron-discharge apparatus." 12763. 30th July, 1943. (606109.)

Sperry Gyroscope Co., Inc.—"Ultra-high-frequency object detecting systems." 14872. 7th September, 1943. (606110.)

British Thomson-Houston Co., Ltd. (General Electric Co.).—"Thermionic valve oscillator circuits." 16839. 4th September, 1944. (606111.)

1945

Furzehill Laboratories, Ltd., S. Smith & Sons (England), Ltd., and F. R. Milsom.—"Electrical bridge circuits." 4518. 22nd February, 1945. (606113.)

Philco Radio & Television Corporation.—"Wide band vacuum-tube amplifiers." 10865. 28th April, 1944. (605947.)

Standard Telephones & Cables, Ltd., P. K. Chatterjea and L. W. Houghton.—"Arrangements for locating obstacles by electromagnetic waves." 14633. 8th June, 1945. (Addition to 586833.) (606118.)

Soc. A. R. L. Etablissements Bresson.—"Compensated thermal relay, principally for use in remotely controlled circuits." 15619. 19th August, 1944. (605950.)

British Thomson-Houston Co., Ltd.—"Holders for tubular lamps." 16357. 30th June, 1944. (605875.)

Marconi's Wireless Telegraph Co., Ltd.—"Angle modulated carrier wave detector." 17986. 14th July, 1944. (Addition to 605715.) (605878.)

Standard Telephones & Cables, Ltd.—"Directive antenna array." 20073. 7th September, 1942. (606124.)

Brush Development Co.—"Systems for controlling and actuating apparatus by sound signals." 23500. 31st January, 1944. (606129.)

D. D. White, F. R. Osborn and S. Reich.—"Electric recording by deposition of dye, pigment, other colouring matter or the like." 23545. 12th September, 1945. (Cognate application 11721/46.) (606130.)

D. D. White and F. R. Osborn.—"Electrical means for reproducing photographs or like pictures including multi-coloured pictures." 23992. 17th September, 1945. (606133.)

Landis & Gyr Soc. Anon.—"Apparatus for the selective switching-off of sections of line of an electric distribution network." 24834. 26th September, 1944. (605886.)

Standard Telephones & Cables, Ltd.—"Facsimile system." 28955. 15th December, 1942. (606138.)

Standard Telephones & Cables, Ltd.—"Radio direction finders." 29216. 11th December, 1942. (606139.)

Farnsworth Television & Radio Corporation.—"Television transmitting system." 29393. 15th February, 1945. (605961.)

Communications Patents, Ltd., L. E. C. Hughes and R. V. Roscoe.—"Suspension of electric conductors." 29636. 7th November, 1945. (605891.)

Akt.-Ges. Brown, Boveri & Cie.—"Ward Leonard arrangement for wide ranges of speed." 30515. 4th May, 1945. (605892.)

E. P. Rudkin.—"Television systems." 31425. 21st November, 1945. (606145.)

Cathodeon, Ltd., and G. Liebmann.—"Electron-discharge tubes." 32128. 28th November, 1945. (606147.)

Power Jets (Research & Development), Ltd., G. B. R. Feilden and W. M. Ogston.—"Blading of turbines, compressors, and like machines." 34827. 21st December, 1945. (606151.)

1946

K. E. Beswick.—"Electric fuses." 610. 7th January, 1946. (605980.)

L. Sadler.—"Choking-coils for fluorescent lighting systems." 652. 8th January, 1946. (605988.)

Philco Products, Inc.—"Radio detecting and ranging devices." 679. 27th January, 1945. (606019.)

R. Nielsen and H. G. Hansen.—"Electrically driven submerged pump." 706. 10th May, 1940. (606027.)

Metropolitan-Vickers Electrical Co., Ltd., and J. L. Higson.—"Electrical connectors, more particularly but not exclusively of radio valves, incandescent filament lamps, and holders therefor." 810. 9th January, 1946. (606054.)

W. H. Wilson and A. J. Chinn.—"Magnetic snap-action switches." 812. 9th January, 1946. (606055.)

Compagnie Générale d'Electricité.—"Stop joint for fluid circulation cables." 815. 17th May, 1944. (606056.)

R. L. Hartwell.—"Electrical resistance and method of producing same." 824. 9th January, 1946. (606056.)

S. Cox, Ltd., and S. Cox.—"Electrical nerve stimulating apparatus and the like." 1374. 15th January, 1946. (Cognate application 1311/47.) (605994.)

Marconi's Wireless Telegraph Co., Ltd.—"Selector apparatus." 2250. 24th January, 1945. (606156.)

Siemens Bros. & Co., Ltd., and J. D. Leslie.—"Automatic selecting switches." 5635. 22nd February, 1946. (605919.)

Patelhold Patentverwertungs- & Elektro-Holding, Akt.-Ges.—"Arrangement for vaporizing liquids by electric high-frequency induction." 5640. 21st December, 1945. (606165.)

Philips Lamps, Ltd.—"Push-pull amplifying circuits." 6244. 4th July, 1941. (606004.)

Pye, Ltd., and C. H. Babbs.—"Electromagnetically focused and deflected cathode-ray devices." 6548. 2nd March, 1946. (606005.)

British Thomson-Houston Co., Ltd. (General Electric Co.).—"Pulse receiver circuits." 6849. 5th March, 1946. (606170.)

Standard Telephones & Cables, Ltd.—"Trimeric alpha methyl para methyl styrene and method of making the same." 8186. 4th June, 1945. (606085.)

Marconi's Wireless Telegraph Co., Ltd.—"Optical projection screens." 8346. 17th March, 1945. (606010.)

Standard Telephones & Cables, Ltd., and J. S. P. Roberton.—"Electromagnetic vibratory devices." 11669. 16th April, 1946. (606012.)

J. S. Rowntree.—"Fixing means for fluorescent lighting fittings." 12007. 18th April, 1946. (606089.)

W. Brooke and H. T. Baldwin.—"Protective control systems for electric motore." 12771. 27th April, 1946. (605927.)

Alltools, Ltd., A. Graves and G. A. R. Tomes.—"Ionization counter tubes." 16593. 31st May, 1946. (606013.)

General Electric Co., Ltd., and V. N. Halliday.—"Starting arrangements for thermionic-discharge lamps." 23918. 13th August, 1946. (605928.)

1948

W. Brooke and H. T. Baldwin.—"Protective control systems for electric motors." 369. 27th April, 1946. (Divided out of 605927.) (605932.)

British Thomson-Houston Co., Ltd.—"Tubular lamps." 11110. 30th June, 1944. (Divided out of 605875.) (605933.)

CONTRACT INFORMATION

ACCEPTED TENDERS AND PROSPECTIVE ELECTRICAL WORK

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Argentina.—BUENOS AIRES.—4th January. Directorate General of Water and Electric Power. Electrical measuring and testing instruments for testing turbo-generating sets for the hydro-electric power stations which the Department is building. (Ref. 39245/48.)*

National Oilfields (Yacimientos Petroliferos Fiscales, Av. R. S. Peña 777, Buenos Aires): 5th October—transformers, insulators; 6th October—welding sets; 11th October—electrically driven pumping sets; 19th October—electrical conductors; 25th October—electric cable; 8th November—accumulators.

Department of Water and Electric Power (Dirección General de Agua y Energia Electrica, Lavalle 1556, Buenos Aires): 28th September—transformers, circuit breakers, insulators, etc.

Australia. — Melbourne. — 5th October. Deputy Director of Posts and Telegraphs. Switchboard type cords, induction coils and switch parts. Details are available at the office of the High Commissioner for Australia, Australia House, Strand, London, W.C.2.

22nd September.—State Electricity Commission of Victoria. Electrically operated overburden spreader. (Ref. 19143/48.)*

15th October. Brisbane City Council, Department of Electricity Stores, Abbotsford Road, Mayne, Brisbane. Multicore underground control cable and jointing material. (Ref. 39541/48.)*

Belfast.—3rd September. Electricity Department. Portable three-phase recording ammeter; and supply and erection of fire extinguishing apparatus at substations. (20th August.)

Burnley.—6th September. Town Council. Wiring for extensions to Bank Hall Maternity Hospital. (20th August.)

Coventry.—4th September. Education Committee. Electrical installation at new school, Canley. (See this issue.)

Erith.—31st August. Borough Council. Supply of electric lamps for the six months ending 31st March, 1949. Borough engineer and surveyor, Council Offices, Erith, Kent.

Musselburgh. — 11th September. Town Council. Electrical work for public wash-house extension. Schedules, etc., from burgh surveyor, Municipal Office.

New Zealand.—INVERCARGILL.—17th September. Electricity Department. Six 50,000-kVA distribution transformers. (Ref. 38896/48.)*

South Africa.—JOHANNESBURG.—21st October. South African Railways and Harbours. Overhead fittings (contact wire terminal cones, contact wire splicing clamps, contact wire steady arm clips, steady arm sockets, suspension insulators). (Ref. 39276/48.)*

PRETORIA.—15th November. City Council. Nine 33,000/11,500-V, 20,000-kVA on-load, tap-changing transformers to specification No. 325, which is obtainable from the Controller of Municipal Stores, Lorentz Street, Pretoria (£2 2s. per copy).

Torquay.—2nd September. Town Council. Electrical installations in 150 houses in two groups at Combe Pafford. Borough Surveyor's Office, Town Hall.

Uruguay. — MONTEVIDEO. — 1st October. Usinas Electricas y Telefonos del Estado. 190,000 incandescent electric lamps. (Ref. 39448/48.)* 8th September. Usinas Electricas y Telefonos del Estado. 6,500 condenser tubes and 13,000 tapped ferrules. (Ref. 39126/48.)*

* Specifications may be inspected at the Export Promotion Department, Thames House North, Millbank, S.W.1.

Orders Placed

Cumberland.—County Council. Accepted. Electrical wiring, etc., at Sandhills Lane clinic, Whitehaven (£218).—J. W. Cullen, Carlisle.

Darlington.—Corporation. Accepted. Improvement of electrical installation at Technical College (£1,442).—North Eastern Electricity Board.

Douglas (I.O.M.).—Corporation. Recommended. Two 2,500-kVA transformers (£4,309) and one 750-kVA (£988) for power station extension; and one 1,000-kVA transformer (£1,143) and five 250-kVA (£1,908) for change-over.—English Electric Co. Concrete cooling tower in connection with the Pulrose power station extension (£29,668).—Davenport Engineering Co.

East Riding.—County Council. Accepted. Improvements to the electricity system at Bridlington School (£1,967).—G. T. Spaven.

London.—City Corporation. Furnaces for City of London Crematorium (£10,386).—Birmingham Electric Furnaces.

Recommended. Electric and gas illuminated guard posts for refuges (£2,869).—Franco Signs.

Bridge House Estates Committee. Recommended. Replacement of existing gas lighting in the boiler rooms and certain other exposed and inaccessible parts of Tower Bridge by electric lighting (£294).—Girdlestone & Co.

Warwickshire.—County Council. Accepted. Electrical work at Secondary Modern School, Castle Bromwich (£2,840).—Barnett & Soans, Wellingborough. At Holland Road County Secondary Modern School, Sutton Coldfield (£3,274).—Electrical Installations.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Ashton-under-Lyne.—Extensions to works, Wellington Street and Dean Street, J. C. Carlson, Ltd.; E. B. Jones & Rawlinson, Ltd., builders, Leaf Square, Pendleton, Salford.

Bath.—Furniture factory and depository, Lower Bristol Road; Hampton & Son, Ltd., Pall Mall East, S.W.1.

Blackpool.—Sports stadium and restaurant, Stanley Park; Alex. Holt, architect, 177, Victoria Road, Thornton Cleveleys.

Houses (44), Grange estate, for T.C. (£62,833); Clifton Construction (Blackpool), Ltd., builders, Marton.

Bolton.—R.C. primary school, Breightmet; H. Greenhalgh, architect, 15, Mawdsley Street.

Bramerton.—Additions to Boys' Remand Home, for Norfolk E.C.; F. G. Limmer, architect, Stracey Road, Norwich.

Brighton.—Police headquarters (two-storey building); borough surveyor.

Bristol.—Rebuilding Hippodrome (after fire), for Stoll Theatres, Ltd.; C. A. Hayes & Sons, builders, Hotwells, Bristol.

Canterbury.—Restoration of Guildhall (£15,000); L. H. Wilson, city architect.

Cheshunt.—Houses (44), Bury Green estate; E. W. Baker, Ltd., builders, Rowden Works, Chingford, E.4.

Chesterfield.—Extensions to works for Sheepbridge Coal & Iron Co., Ltd.; S. J. Smith, chief engineer.

Chinley.—County college; F. H. Crossley, county architect, St. Mary's Gate, Derby.

Cockermouth.—Factory at Derwent Mill for West Cumberland Development Co., Ltd.

Colchester.—Houses (48), Barnhill and King George Avenue sites; borough engineer.

Dartford.—Offices for Ministry of National Insurance, Princes Road; Kent & Sussex Contractors, Ltd., builders, 109, Station Road, Sidcup.

Extensions to works for Abwood Tool & Engineering Co., Ltd., Princes Road; F. W. Pamplin, architect, 57, Sherwood Way, West Wickham.

Exeter.—Laboratories for University College of the South-West of England (£85,000); E. Vincent Harris, architect, 19, West Eaton Place, S.W.1.

Felixstowe.—Junior school, Maidstone Road, for East Suffolk E.C.; E. J. Symcox, county architect, Ipswich.

Galashiels.—Conversion of building for use as hostel for students; secretary, Scottish Woollen Technical College, Galashiels.

Glasgow.—Houses (178), Cardonald Mill; housing architect, 20, Trongate.

Gravesend.—Dwellings (50), Christian Fields Avenue, King's Farm; borough architect, Woodville Terrace.

Heathfield.—County modern school for East Sussex E.C.; R. Cook & Son, builders, Crawley.

Hebburn.—Factories for the Durham China Co.; Newrick & Blackbell, John Street, Sunderland.

Hereford.—Works extensions; Painter Bros., Ltd., Mortimer Road.

Hounslow.—Flats (32) and houses (48), Hounslow West estate, for Heston and Isleworth T.C.; borough engineer, 88, Lampton Road.

Hull.—Telephone exchange, North Newington; city architect, Guildhall.

Factory, Reform Street; L. Worsdall & Son, 23, Salthouse Lane.

Lincoln.—Permanent houses (82), Boultham Moor North; housing architect, Stamp End.

Liverpool.—Central baths, Cornwallis Street; city architect.

County primary school at Netherton (£31,037); G. Noel Hill, county architect, County Offices, Preston.

Llandilo.—Houses (46), for R.D.C.; N. E. Evans, surveyor, Council Offices, Crescent Road.

London.—WESTMINSTER.—Office block, 11/12, Buckingham Gate; John Howard & Co., Ltd., builders, 13, Buckingham Gate.

BERMONDSEY.—Extensions to factory for Tower Bridge Cooperage, Ltd., 5, Potters Fields.

Manchester.—Extensions to chemical works and offices, Collyhurst, for Hardman & Holden, Ltd.; J. Price Nunn & Partners, architects, 180, Oxford Road.

Additions to works, West Gorton, for J. Cockshoot & Co., Ltd.; J. W. Beaumont & Sons, architects, 53, Spring Gardens, Manchester, 2.

Marlborough.—Grammar school; county architect, County Offices, Trowbridge, Wilts.

Norwich.—Transmitting station, Acle-Great Yarmouth road, for B.B.C.; J. Youngs & Sons, Ltd., building contractors, 24, City Road, Norwich.

Nottingham.—Extensions to County Hall, Trent Bridge (£61,000); county architect, Shire Hall, Nottingham.

Sunderland.—Factory additions in Rutland Street for John Lynn & Co., Ltd., engineers.

West Bromwich.—Factory, Colliery Road; Tool Treatments, Ltd., 1, Hall Green Road, Stone Cross, Staffs.

Westbury.—Cement works (£800,000) Associated Portland Cement Mfrs., Ltd., Ashley Gardens, S.W.1.

West Riding.—Sixteen day nurseries in industrial areas, for County Council; county architect, Wakefield.

Workington.—Extensions to engineering works, Moss Bay, for Workington Iron & Steel Co., Ltd.; chief engineer.